

Cite as: *Can Urol Assoc J* 2019;13(9Suppl6):S173-208. <http://dx.doi.org/10.5489/cuaj.6197>

## Moderated Poster Session 1: Basic Science, Best Practices, and Benign Disease

### MP1-01

#### WATER II: Aquablation therapy for benign prostatic hyperplasia (80–150 cc) 12-month safety and efficacy results

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**Introduction:** In a large, blinded, multicenter, randomized trial (WATER), Aquablation (PROCEPT BioRobotics, Inc., USA), an ultrasound-guided, robotically executed waterjet ablative procedure demonstrated improved urinary symptom scores that were comparable to those found after transurethral resection of the prostate (TURP) in men suffering from benign prostatic hyperplasia (BPH) with gland sized between 30 and 80 cc. A previous study subset analysis revealed that patients with larger gland sizes demonstrated better outcomes with Aquablation compared to TURP. These observations identified the need to assess the safety and efficacy of performing Aquablation in men with larger prostate glands (80–150 cc) (WATER II). Herein, we report the 12-month outcomes.

**Methods:** WATER II (NCT03123250) is a prospective, multicenter, international clinical trial of Aquablation for the surgical treatment of lower urinary tract symptoms (LUTS)/BPH in men 45–80 years old with a prostate between 80 cc and 150 cc. At both baseline and followup, subjects completed the following: International Prostate Symptom Score (IPSS), Incontinence Severity Index, Pain Intensity Scale, Quality of Recovery Visual Analog Scale, International Index of Erectile Function (IIEF-15), the Male Sexual Health Questionnaire (MSHQ-EjD), uroflowmetry, and post-void residual (PVR) volume measurements.

**Results:** A total of 101 subjects meeting eligibility criteria were enrolled at 13 U.S. and three Canadian sites between September and December 2017. Mean operative time (handpiece placement to urinary catheter placement) was 37 minutes and mean Aquablation resection time was 7.8 minutes. No subject underwent post-Aquablation cautery for hemostasis. Mean length of stay was 1.6 days. Two patients went home the same day of surgery. Mean IPSS improved from 23.2±6.3 at baseline to 5.9±5.4 at six months and maximum urinary flow rate increased from 8.7 to 18.8 cc/sec. Eight-one percent of the sexually active men in this study (107 cc baseline prostate size) maintained their ejaculatory function; the mean MSHQ-EjD score dropped by only -1.4 and the SHIM score dropped by 0.1. The primary safety endpoint, defined as Clavien-Dindo Grade 2 or higher or any Grade 1 event resulting in persistent disability at three months, occurred in 45.5% of men. Bleeding events were observed in 14 patients. Eight patients received blood transfusions.

**Conclusions:** Aquablation is a reasonable surgical alternative in patients with larger prostate volumes, with high levels of short-term (12-month) efficacy coupled with low operative times and lengths of hospital stay, maintenance of ejaculatory function, and acceptable complication and transfusion rates. Learning curve, even in the setting of a larger prostate volume, is short. Long-term followup will be required to determine overall durability of this novel procedure.

### MP1-02

#### Trial of void with saline bladder instillation: A randomized controlled trial — preliminary results

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**Introduction:** The time associated with void trial after removal of urethral catheter can delay patient discharge. Previous work suggests instillation of normal saline into the bladder can be used to shorten the void trial and, thereby, improve time to discharge, without evidence it increases risk to the patient. Clinical experience suggests warmed saline instillation is more comfortable for the patient and may allow for more accurate and successful trial of void. We designed a randomized, controlled trial, comparing the standard trial of void with two saline instillation methods.

**Methods:** Postoperative urology patients with urethral catheters were consented and randomized into one of three groups: standard void trial (SVT), room temperature saline instillation void trial (RVT), and warm saline (~37° C) instillation void trial (WVT). For the SVT group, the catheter was removed, patient asked to void, and post-void residual (PVR) recorded. Those in the RVT and WVT groups had no more than 350 mL of normal saline instilled into their bladders through the catheter by gravity before void trial performed. Adverse events, data surrounding the void trial, and patient demographics were collected. The primary endpoint was the time from catheter removal to completion of void trial. Power analysis suggested 240 patients necessary to achieve a 90% power to detect a statistically significant difference (two tailed alpha=0.05), with an interim analysis at 81 patients.

**Results:** There were no demographic differences between groups, including age, sex, body mass index, diagnosis of diabetes mellitus, recent urinary tract infection, previous retention, or use of alpha blockers, anticholinergics, beta-3 agonists, or 5-alpha reductase inhibitors. Median times to completion of void trial were calculated: SVT (n=26) 124 minutes (interquartile range [IQR] 94–242 min); RVT (n=26) 17 minutes (IQR 5–133 min); WVT (n=31) 45 minutes (IQR 10–240 min). The RVT and WVT groups were not different from one another but both were statistically significantly different from the SVT group (p<0.001 and p=0.018, respectively; Kruskal Wallis test with Bonferroni corrected Mann-Whitney tests for pairwise comparisons).

**Conclusions:** Instillation of saline prior to removal of catheter decreases the time to completion of a void trial compared to the standard method, thus allowing for more timely discharge from the hospital. Warmed saline does not appear to confer a benefit in this regard. Analysis of secondary outcomes will help us to further compare these three techniques.

### MP1-03

#### The relationship between prostate volume size and international prostate symptom score, quality of life and prostate-specific antigen in patients with benign prostatic hyperplasia: A retrospective review with the Rezum system

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**Introduction:** Studies have shown prostate volume (PV) to be related to the progression of lower urinary tract symptoms (LUTS) due to benign prostatic hyperplasia (BPH). We evaluated the relationship between PV and International Prostate Symptom Score (IPSS), quality of life (QoL), and prostate-specific antigen (PSA). We also evaluated the relationship between the change in PV after treatment with the Rezum system, a minimally invasive surgical option for BPH, and changes in IPSS, QoL, and PSA.

**Methods:** A total of 96 men, aged 40–80 years, who had treatment with the Rezum system, baseline PVs from 18–110 cc, IPSS 8, and no prior diagnosis of prostate cancer were included in a retrospective review. Patients were interviewed using standardized questionnaires to collect IPSS and QoL at baseline and 12 months post-treatment. PV was measured through a transrectal ultrasound at baseline and within six months post-treatment. PSA was collected at baseline and 12 months post-treatment. The relationships between these parameters were analyzed with Spearman correlation coefficients, one-way ANOVA, and Tukey HSD tests.

**Results:** Baseline PV showed a moderate, positive correlation with PSA ( $r=0.67$ ;  $p<0.01$ ) but no correlation with IPSS ( $r=-0.18$ ;  $p=0.08$ ) and QoL ( $r=-0.16$ ;  $p=0.12$ ). Baseline IPSS and QoL were not statistically significant when compared to baseline PV groups,  $<40$  g,  $40$ – $60$  g, and  $>60$  g, but baseline PSA was statistically higher in baseline PV group  $>60$  g when compared to the other PV groups ( $p<0.01$ ) (Table 1). There was a moderate, positive correlation between percent reduction in PV and point reduction in PSA ( $r=0.41$ ;  $p=0.02$ ) but no correlation between percent reduction in PV and point reduction in IPSS ( $r=0.08$ ;  $p=0.52$ ) and QoL ( $r=0.18$ ;  $p=0.16$ ).

**Conclusions:** PV was not correlated with IPSS and QoL but moderately correlated with PSA. PV  $>60$  g had higher PSA levels when compared to PVs  $<60$  g. There was a correlation between percent reduction in PV and point reduction PSA but no correlation between percent reduction in PV and point reduction in IPSS and QoL. Therefore, PV should not be the sole determinant when treating LUTS due to BPH.

*This paper has figures, which may be viewed online at: <https://www.eventscribe.com/2019/nsaua/SearchByBucket.asp?pf=Track>*

## MP1-04

### Evolution of BPH healthcare costs: 2004–2013

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**Introduction:** Evolving benign prostatic hyperplasia (BPH) management has changed the distribution of healthcare spending. We characterized BPH-related Medicare and private insurance expenditures stratified by care-delivery location over a 10-year period.

**Methods:** As part of the Urologic Diseases in America (UDA) project, two insurance claims databases were analyzed: CMS 5% Sample (Medicare beneficiaries age 65) and Optum<sup>®</sup> Clinformatics<sup>®</sup> Data Mart (CDM, patient data de-identified privately insured adults age 40–64). BPH-related expenditures from 2004–2013 were stratified by three care-delivery locations: inpatient, hospital-based outpatient (HBO), and physician-office based outpatient (POBO).

**Results:** Over 10 years, inpatient BPH care accounted for a decreasing percentage of total dollars spent by Medicare (30% to 15%) and private insurance (37% to 15%). Relative outpatient costs rose, especially for private insurance (61% to 83%). Per-BPH-patient-per-year costs for HBO care rose and exceeded POBO costs from 2007 onward for private insurance, and from 2010 onward for Medicare (Fig. 1).

**Conclusions:** The distribution of healthcare expenditures for BPH management shifted across practice settings from 2004–2013, with increasing outpatient costs relative to inpatient costs. HBO expenses exceeded POBO and inpatient expenses for both Medicare and private insurance. This may be a result of the increased use of ambulatory surgical procedures for BPH. In-office minimally invasive surgical therapies will likely lead to higher POBO costs in the future.

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## MP1-05

### Voiding dysfunction: Gender and the general urologist

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**Introduction:** Women comprise 8.8% of urologists, with 55% practicing general urology. There is a perception that the female general urologist will be responsible for an outsized proportion of female urology and voiding dysfunction. Female general urologists have been shown to perform approximately twice as many urogynecologic procedures as their male counterparts. Our objective is to determine the relationship between physician gender, and performance of gender-neutral, female- and male-specific voiding dysfunction procedures.

**Methods:** General urologist American Board of Urology certification case logs from 2002–2017 were analyzed by CPT code for urodynamics (UDS; 51728, 51729), bladder chemodenervation (52287), sacral neuromodulation (SNM, 64590), transurethral resection of the prostate (TURP, 52601), laser vaporization of the prostate (PVP, 52648), simple prostatectomy (55801, 55821, 55831), male sling (53440), artificial urethral sphincter (AUS, 53445), and periurethral bulking (51715). Rates of procedure performance procedure and patient gender were analyzed by Z-test with significance at  $p<0.05$ .

**Results:** Overall, 447 (7.6%) female and 5449 (92.4%) male general urologists were included. A higher proportion of female general urologists performed UDS (59% vs. 50%;  $p<0.001$ ), bladder chemodenervation (29% vs. 15%;  $p<0.0001$ ), SNM (22% vs. 15%;  $p<0.0001$ ), and periurethral bulking (34% vs. 25%;  $p<0.0001$ ) than male general urologists. However, male general urologists were more likely to perform TURP or PVP (95% vs. 87%;  $p<0.0001$ ), male slings (12% vs. 8%;  $p<0.005$ ), and AUS placement (10% vs. 16%;  $p<0.005$ ). There was no significant difference in performance of simple prostatectomy by gender ( $p=0.48$ ). Female general urologists performed chemodenervation and SNM on a higher proportion of female patients than male general urologists, 85% vs. 71% and 85% vs. 76%, respectively ( $p<0.0001$ ). However, male general urologists were more likely to perform UDS on female patients, 44% vs. 41% female patients ( $p<0.0001$ ).

**Conclusions:** More female general urologists perform female-specific voiding dysfunction procedures than their male counterparts, who are more likely to perform male voiding dysfunction procedures. Female general urologists were more likely to perform gender-neutral procedures on women, except UDS, possibly indicating differing practice patterns or that male general urologists may refer patients to female colleagues for further procedural management. Voiding dysfunction procedure access for female patients may be influenced by the lower rate of male general urologists providing these services, especially given the small population of practicing female general urologists.

## MP1-06

### Utilization of low-dose CT scans for nephrolithiasis at a tertiary care hospital

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**Introduction:** Low-dose computed tomography (CT) scans are effective tests for diagnosing and following kidney and ureteral stones, but they are underused nationwide. Consequently, many patients with kidney stones receive unnecessary radiation exposure. Our goal for this study was to assess the prevalence of low-dose CT scans at our facility in preparation for instituting a protocol to increase its usage.

**Methods:** We obtained receipts of all CT scans ordered by one endourologic surgeon between the dates of 12/1/17 and 11/30/18. Included in this list were post-percutaneous nephrolithotomy (PCNL) CT scans for her patients. Only patients who had a non-contrast CT scan ordered for kidney stones were included in the study. For each distinct CT scan, patient body mass index (BMI), ordered protocol, indication, and dose length product (DLP) were compared.

**Results:** There were 69 CT scans in 61 patients identified. Seven instances were excluded because the patient never received the CT scan despite it being ordered. Of the remaining 62 CT scans (58 patients), there were 30 (48%) low-dose CT scans performed. In the 32 patients who underwent

post-PCNL CT scan, 25 (78%) were performed as low-dose protocol. In the 30 patients who underwent CT scan for renal colic or stone monitoring, five (17%) were performed as low-dose protocol. Dose length product was greater for patients who underwent standard protocol CT scans ( $842 \pm 314$  vs.  $446 \pm 155$  mGy\*cm;  $p < 0.001$ ). There was no significant difference in BMI for patients who underwent low-dose protocol ( $32.9 \pm 9.8$ ) vs. standard protocol ( $30.0 \pm 10.3$ ) CT scans ( $p = 0.78$ ).

**Conclusions:** Low-dose CT scans are underused at our institution, with only 48% of patients receiving low-dose scans. In the patient population receiving CT scans for renal colic or stone monitoring, only 17% of patients underwent low-dose CT scan. Unsurprisingly, patients who underwent low-dose CT scan had a lower radiation exposure as measured by DLP. These data may be used to guide future efforts in developing institutional protocols for low-dose CT scans.

## MP1-07

### Symptomatic hydronephrosis of pregnancy: Determining management outcomes

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**Introduction:** Hydronephrosis of pregnancy (HOP) is a common clinical entity. In the case of obstructing urolithiasis, pregnant women can experience flank pain, fever, sepsis, etc. As a result, symptomatic hydronephrosis of pregnancy (SHOP) often requires urgent procedural intervention. Due to diagnostic uncertainty with renal bladder ultrasound, and associated risks with both ureteral stenting (US) and percutaneous nephrostomy (PCN), decision-making surrounding the ideal intervention can be difficult. In addition, there is a paucity of research investigating maternal and fetal outcomes in this setting. Our objective was to characterize outcomes of patients managed at our institution for SHOP with either US or PCN.

**Methods:** After IRB approval, we retrospectively reviewed patients at our tertiary care institution who underwent procedural interventions for SHOP, including US or PCN. Our cohort was identified via EMR search of CPT codes for US or PCN, and the ICD10 code for pregnancy. We conducted multivariable analysis assessing maternal factors (age, body mass index [BMI], gestational age at time of intervention, white blood cell count, hematocrit, platelets, creatinine, temperature), ultrasound parameters, and fetal outcome factors (gestational age of fetus at birth, pre-term vs. term birth, gender, weight, length, APGAR scores, need for NICU admission, and neonatal intubation).

**Results:** Between 2010 and 2018, 46 patients (mean age 27.3 years) underwent 48 total procedural interventions for episodes of SHOP. This included 41 patients who underwent PCN and five who underwent US placement, with no significant clinical variation in subgroups (Table 1). Of note, our analysis demonstrated no difference in maternal/fetal outcome variables between the two procedural groups.

**Conclusions:** Clinical management of symptomatic SHOP can be challenging. At our institution, a vast majority of patients receive PCN when presenting with SHOP. This is due mostly to concern surrounding procedural anesthesia with US. After review of a single-institution data set, our group found no significant difference in maternal/fetal outcomes between initial intervention in this patient population.

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## MP1-08

### Difficult foley catheter consults: Are they truly difficult?

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**Introduction:** Repeated foley catheter attempts or improper catheter placement can lead to patient morbidity and increased healthcare costs. Difficult foley placement is one of the most common reasons for urologic consultation. Here, we examine our difficult foley consultations to identify areas in which strategies can be implemented to reduce adverse events related to foley placement.

**Methods:** This is a prospective, observational study of consultations for

difficult foley catheter placement across four tertiary care hospitals from December 2018 to May 2019. Patients were included in the study if a consultation was requested for difficult foley placement in males older than 18 years. Data collected included age, prior urethral stricture history, history of difficult catheterization, method of catheter placement, type of catheter placed, use of guidewire, use of cystoscopy, and findings on cystoscopy.

**Results:** There were 52 consultations for difficult foley placement during the study period. Six patients (12%) had history of urethral stricture and five patients (10%) had history of difficult catheterization. Half (50%) of patients had two or more attempts at catheter placement prior to urologic consultation. Standard catheter placement was performed in 15 patients (29%), Coude catheter (18 F or 20 F) placement was performed in 16 patients (31%), guidewire placement was used in seven patients (13%), and cystoscopy was used in 11 patients (21%). Of those patients whom required cystoscopy, findings included urethral stricture in six patients (55%) and false passage in five patients (45%).

**Conclusions:** The majority (60%) of difficult foley placement consultations were able to be performed using standard or Coude catheters. This suggests that patient morbidity associated with repeat catheter attempts may be preventable. Preventative strategies include improvement of hospital-wide catheter placement training with specific education on Coude catheter use/placement.

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## MP1-09

### Postoperative radiographic and 24-hour urine profile changes in bariatric patients with a history of nephrolithiasis: Risk factors for recurrent stone formation associated with Roux-en Y gastric bypass vs. sleeve gastrectomy

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**Introduction:** Roux-en-Y gastric bypass (RYGB) and sleeve gastrectomy (SG) are the most common bariatric surgeries, yet it is not clear which is superior. Considering the propensity for the development of lithogenic urinary profiles and nephrolithiasis, post-bariatric surgery is clinically important. To our knowledge, no studies have evaluated these changes in post-bariatric surgery patients with a history of nephrolithiasis. We evaluated the differences in 24-hour urine (24HU) values and radiographic imaging post-RYGB and SG in patients with a history of nephrolithiasis.

**Methods:** We reviewed the records of 100 patients with a history of nephrolithiasis and underwent either RYGB or GS at our center. Computed tomography of kidneys-ureters-bladder (CT KUB) imaging and 24HU profiles were performed preoperatively and at one-year followup. The Wilcoxon rank sum test compared pre- and postoperative values, while multivariate regression analysis determined predictors of stones and hyperoxaluria.

**Results:** Sixty patients underwent RYGB and 40 had SG. No baseline differences were found between groups. For 24HU profiles (Table 1), both groups had similar findings, although the RYGB group had a significant increase in oxalate and a decrease in citrate, while the SG group had a significant decrease in oxalate with citrate remaining stable. On multivariate analysis, RYGB (odds ratio [OR] 6.4; 95% confidence interval [CI] 1.9–21.1;  $p = 0.002$ ) was the only significant predictor of postoperative hyperoxaluria. Radiographically, 26.7% of the RYGB group and 22.5% of the SG developed new stones. Postoperative stone procedure rate for each group was 10.0% and 7.5%, respectively.

**Conclusions:** Patients with a history of nephrolithiasis who underwent RYGB had exacerbated lithogenic 24HU profiles, while those in SG patients improved. There were no significant differences in stone event rate, although this may be due to limited followup. The postoperative stone formation rate is higher than previously reported in similar studies. These findings support close urinary monitoring in patients with a history of nephrolithiasis who undergo RYGB.

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**MP1-10****Surgical wound classification in urology: High variability with minimal utility**

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**Introduction:** Surgical wound classification (SWC) was developed to describe the degree of contamination of surgical wounds and gauge the risk of potential complications. Guidance regarding SWC is lacking for urologic surgery. Prior series have illustrated weak correlation between SWC and surgical site infection (SSI). Providers can have high variability in their interpretation of SWC. Recent studies call into question the utility of SWC in benchmarking risk-adjusted outcomes for quality assurance. We aim to characterize practice patterns of SWC in urology and its ability to risk stratify patients and predict complications.

**Methods:** We queried the ACS NSQIP database for tracked urology procedures at our institution. Of particular interest were operations representing open and minimally invasive approaches to renal surgery. We recorded the SWC for each operation as either clean, clean-contaminated, contaminated, or dirty/infected. Our 30-day outcomes review included superficial incisional infections, deep incisional infections, organ/space surgical infections, and wound disruptions.

**Results:** We reviewed 250 operations performed at our institution from January 1, 2015 to December 31, 2018. The case breakdown and percentage of SWC as clean vs. clean-contaminated operations are outlined in Table 1. Note that two operations were excluded: one contaminated open nephrectomy and one dirty/infected robotic radical nephrectomy. Neither patient developed an SSI. We had very few complications. There was one case of wound disruption without infection in a clean-contaminated open radical nephrectomy. There was one superficial incisional SSI in a clean-contaminated open partial nephrectomy. We had no reports of deep incisional or organ/space SSIs over 250 cases. Overall complications were equal or better than national standards.

**Conclusions:** Current principles classify nephrectomy procedures entering the urinary tract as clean-contaminated surgical wounds. Yet many surgeries are potentially under-classified as clean, changing risk stratification benchmarks. With such few wound-related infectious complications overall, it begs the question of whether SWC is predictive of SSI. Expanding inclusion criteria to national-level data will help elucidate practice patterns and complication rates on a larger scale.

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**MP1-11****Pathological evaluation of vaginal cavity remnants excised during neourethral stricture repair in transgender men**

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**Introduction:** Transmasculine gender affirmation surgery that includes vaginectomy and neophallus creation is commonly associated with urinary complications, including stricture and/or fistula. Additionally, inadequate vaginal de-epithelialization may lead to a vaginal cavity remnant that can cause post-void dribbling, pain, or recurrent infections. Inadequate de-epithelialization combined with pressurized urine from a distal obstruction can cause urine to break through the suture lines of the fixed urethra into the previously obliterated vaginal cavity. We hypothesize that a significant proportion of patients presenting with neourethral strictures have concurrent vaginal cavity remnants, which are composed of vaginal epithelium. Our objective is to determine the prevalence of patients who require cavity re-excision and obliteration during neourethral stricture repair and to determine the histological composition of the excised tissue.

**Methods:** We retrospectively reviewed all transgender male patients who underwent neourethral stricture repair from January 2014 to May 2019. Preoperative retrograde urethrograms and operative reports were reviewed to determine the presence of a vaginal cavity remnant that was re-excised and obliterated at the time of neourethral reconstruction. All excised pathological specimens were analyzed.

**Results:** A total of 37 consecutive transgender male patients with a mean

age of 39 years (23–61 years) who underwent neourethral stricture repair were identified. Of those patients, 30/37 (81%) had prior phalloplasty and 7/37 (19%) had prior metoidioplasty. All prior operative reports indicated history of prior vaginectomy. At the time of neourethral stricture repair, a total of 15/37 (41%) patients were found to have vaginal cavity remnants, which included 11/30 (37%) of phalloplasty patients and 4/7 (57%) of metoidioplasty patients. Pathological evaluation revealed all specimens had characteristics consistent with vaginal epithelium. Additional findings included chronic inflammation (10), fibrosis (7), granulation tissue (2), microabscesses (1), calcification (1), and multinucleated giant cells (1).

**Conclusions:** A high percentage of patients who present with neourethral complications following transmasculine gender affirmation surgery have vaginal cavity remnants despite prior reports of vaginectomy. Pathological evaluation confirms that all vaginal cavity remnant specimens contain vaginal epithelium that was not completely excised.

**MP1-12****Nudge theory and the reduction in opioid overprescribing in urologic surgery**

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**Introduction:** The urologic community universally over-prescribes opioids, particularly with prostatectomy and nephrectomy patients. We sought to use nudge theory to decrease our postoperative opioid prescriptions with the intent to get prescribers to anchor to zero prescribing where possible.

**Methods:** We retrospectively reviewed the electronic medical record to obtain baseline opioid prescribing habits over a four-month period among surgeons performing nephrectomies and prostatectomies (pre-nudge period). Data collected for each surgeon included number of opioid pills prescribed per surgery, type of surgery (nephrectomy or prostatectomy), and technique (open vs. laparoscopic). Nudge technique was then applied for six months which included monthly reports comparing each surgeon's median number of opioids prescribed, positive reinforcement via text messaging, and grand rounds presentations summarizing both the opioid crisis and monthly reports. During the nudge period, the same data was collected prospectively. Paired t-test was used to compare the difference in median number of pills prescribed.

**Results:** Thirteen surgeons performed 138 prostatectomies during the pre-nudge period and 42 prostatectomies in the last month of the nudge period. The median number of opioids prescribed decreased from 30 (15–45) to 2.5 (0–20) at the end of the nudge period, a 92% reduction ( $p < 0.001$ ). Fifteen surgeons performed 114 nephrectomies during the pre-nudge period and 32 nephrectomies in the last month of the nudge period. The median number of opioids prescribed decreased from 30 (14–50) to 8 (0–20), a 73% reduction ( $p < 0.001$ ).

**Conclusions:** The application of nudge theory to reduce the number of opioid pills prescribed for postoperative pain after prostatectomy or nephrectomy is effective. This may help reduce the surgeon's impact on propagating the opioid crisis.

*This paper has figures, which may be viewed online at: <https://www.eventscribe.com/2019/nsaua/SearchByBucket.asp?pfp=Track>*

**MP1-13****Widespread and large statewide generic price variation in benign prostatic hyperplasia and overactive bladder medications**

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**Introduction:** Regional medication price variations remain a barrier to the standardized treatment of chronic medical conditions since the passage of the Affordable Care Act. Medical therapy remains the first-line treatment for benign prostatic hyperplasia (BPH) and overactive bladder (OAB), which are both common in the aging male population. We sought to investigate statewide variations in BPH and OAB drug pricing to assess transparency and patient access to affordable medication sources.

**Methods:** A list of all licensed pharmacies was obtained from the Pennsylvania State Board of Pharmacy. Each was categorized as inde-

pendent, big chain, hospital, or specialty. The out-of-pocket price for a 30-day supply of tamsulosin (0.4 mg), finasteride (5 mg), oxybutynin (5 mg TID), and oxybutynin XL (10 mg) were obtained using a scripted telephone survey. Median test was used to assess regional differences in pricing. We looked at regional variation by categorizing pharmacies based on data from the Pennsylvania Health Care Cost Containment Council.

**Results:** We identified 627 pharmacies, of which 473 responded to our survey (response rate 75%). Two-thirds were classified as big chain retailers, with the remaining third being independently owned pharmacies. No hospital or specialty pharmacies would reveal their pricing. There was significant variation between pharmacies, with independent retailers being uniformly cheaper than big chain pharmacies for all products ( $p < 0.001$ ). The maximum difference was seen with finasteride at \$52. Additionally, there was substantial regional variation in price for a given drug and pharmacy category, with the biggest difference observed for tamsulosin among big chain retailers (\$34 difference across nine regions).

**Conclusions:** Wide variations exist in the pricing of generic BPH and OAB medications. Independent pharmacies are uniformly cheaper. This study highlights the lack of transparency with generic drugs and suggests patients should actively shop around for the best price.

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## MP1-14

### Will anesthesia type affect mortality post-TURP?

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**Introduction:** Studies have documented the successful use of neuraxial anesthesia (NA) in the setting of transurethral resection of the prostate (TURP), with potential benefits of detecting early cognitive symptoms of irrigation-induced dilutional hyponatremia. In this study, we sought to assess the effect of NA blockade on 30-day mortality by examining the National Surgical Quality Improvement Program (NSQIP) data maintained by the American College of Surgeons (ACS).

**Methods:** ACS-NSQIP data was queried for patients who underwent TURP between January 2014 and December 2016, which identified a total of 18 007 patients, of which 4101 underwent NA. Cross-tabulation with Chi-square analysis and Kaplan-Meier log-rank tests were used for univariate comparisons. After propensity score (1:1) matching for all confounding variables, NA was compared to all other modalities of anesthesia (OAM) for the frequency of death within 30 days (main endpoint) and other complications.

**Results:** Of the 4101 patients who underwent NA, 18 (0.04%) died within 30 days of surgery. Of the 13 906 patients who underwent other methods of anesthesia, 61 (0.04%) patients died within 30 days of surgery. Following 1:1 matching, there was no survival benefit between the NA group ( $n=1323$ ) and the OAM group ( $n=1323$ ) within 30 days ( $p=0.104$ ). Additionally, NA did not affect the frequencies of cardiac, respiratory, renal, venous thromboembolic, and bleeding complications after TURP.

**Conclusions:** Despite theoretical advantages of neuraxial blockade, our study shows that neuraxial blockade has no statistically significant effect on 30-day mortality.

*This paper has figures, which may be viewed online at: <https://www.eventscribe.com/2019/nsaua/SearchByBucket.asp?pf=Track>*

## MP1-15

### Real-world outcomes of the prostatic urethral lift

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**Introduction:** Prostatic urethral lift (PUL) has been shown to provide rapid, significant, and durable improvement in symptom relief and quality of

life, including preservation of sexual function, for patients with BPH. To determine whether PUL outcomes in the real-world support those from clinical studies, the largest unconstrained examination of commercial PUL cases was conducted.

**Methods:** A retrospective analysis of 1413 consecutive PUL patients across 14 sites in North America and Australia was performed through a series of individual chart reviews under IRB approval. Baseline demographics and symptom outcomes of real-world retrospective (RWR) subjects were compared to subjects in the randomized L.I.F.T. study. International Prostate Symptom Score (IPSS), quality of life (QoL), and maximum urinary flow rate (Qmax) were evaluated at 1, 3, 6, 12 & 24-months post-procedure for all non-urinary retention subjects (Group A) and retention subjects (Group B). Within Group A, outcomes were further analyzed using paired t-tests and 95% mean confidence intervals for the following parameters: IPSS baseline 13, age, prostate size, site of service, prostate cancer treatment, and diabetic status. Surgical interventions, adverse events and catheterization rates were summarized in detail.

**Results:** RWR subjects were older, had lower baseline IPSS and QoL and higher Qmax compared to those from the L.I.F.T. study. Following PUL, mean IPSS for Group A improved significantly from baseline by at least 8.1 points throughout follow up and 84% of subjects required no catheter. No significant differences were observed between Group A and B absolute symptom scores. Within Group A, subjects with an IPSS baseline 13 behaved similarly to L.I.F.T. Age ( $<50$  vs. 50 years), prostate volume ( $<30$  cc; 30 to  $<80$  cc; 80 cc), site of service, prior cancer treatment, and diabetic status did not significantly affect PUL effectiveness. Previous prostate cancer treatment did not elevate adverse events of high concern, such as severe bleeding, incontinence, and infection. When completed in a clinic office, PUL resulted in less side effects and catheter placement compared to other sites of service.

**Conclusions:** PUL performs well in a real-world setting in terms of symptom relief, morbidity, and patient experience for all examined patient cohorts, and confirms pivotal clinical study results.

*This paper has figures, which may be viewed online at: <https://www.eventscribe.com/2019/nsaua/SearchByBucket.asp?pf=Track>*

## MP1-16

### Connective tissue growth factor upregulation evident during obstructive uropathy/nephropathy promotes glycolytic reprogramming and renal fibrosis

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**Introduction:** A fraction of patients with obstructive uropathy develop chronic renal disease due to the refractory nature of fibrosis to current therapy. Persistent tubular injury, activation of cytokines/growth factors, inflammation, extracellular matrix (ECM) deposition following renal insults leads to fibrosis. CTGF is a major profibrogenic cytokine, persistently upregulated in the tubules, interstitial cells, and glomeruli during progressive renal disease driven by acute kidney insults. CTGF conditional ablation in mice leads to an attenuation of fibrosis following renal obstruction. Metabolic alterations recently emerged as critical contributors to renal fibrosis and increased aerobic glycolysis are evident during progressive obstructive nephropathy in mice. Here, we test the hypothesis that persistent CTGF upregulation promotes aerobic glycolysis by upregulating the expression of three enzymes that regulate irreversible steps of glycolysis: hexokinase, phosphofructokinase-1, and pyruvate kinase. We further investigated the potential pathological relationship between glycolysis and the fibrotic response orchestrated by CTGF.

**Methods:** Human kidney tubular epithelial cells (HK-2) were stably transduced with either control vector (CMV-control) or CTGF (CMV-CTGF) expression constructs driven by CMV promoter via lentiviral transduction to mimic persistent CTGF expression during renal injury. Phenotypic alterations, fibrotic marker expression, and glycolytic enzyme expression were assessed by western blot analysis and microscopy. 2-deoxyglucose (2-DG) was used to inhibit aerobic glycolysis and to study the impact of glycolytic suppression on fibrotic reprogramming.

**Results:** CTGF stable expression in HK-2 cells promoted ECM synthesis,

epithelial cell dedifferentiation, and p21 expression compared to CMV-control cells. CMV-CTGF cells also upregulated expression of hexokinase, phosphofructokinase-1, and pyruvate kinase compared to vector transduced control HK-2 cells. Incubation of CMV-CTGF cultures with increasing doses of 2-DG dose dependently attenuated ECM production and p21 expression, suggesting that glycolytic inhibition attenuated fibrotic responses induced by CTGF.

**Conclusions:** Sustained CTGF expression promoted fibrotic renal epithelial dysfunction, as well as glycolytic reprogramming evidenced by increased expression of the three key glycolytic enzymes. Inhibition of glycolysis attenuated CTGF-driven fibrogenesis, linking glycolytic reprogramming to fibrogenesis. Thus, future studies will determine whether targeting glycolysis would be a new strategy to halt renal fibrosis resulting from obstructive nephropathy.

### MP1-17

#### The new co-chaperones FNIP1 and Tsc1 function cooperatively to chaperone the tumor suppressor FLCN

R. Sager, M. Woodford, S. Backe, D. Post, O. Shapiro, G. Bratslavsky, M. Mollapour

SUNY Upstate Medical University

**Introduction:** Birt-Hogg-Dubé (BHD) and Tuberous Sclerosis Complex (TSC) syndromes share many clinical similarities and both consist of cutaneous, pulmonary, and renal manifestations. Renal tumors in BHD syndrome are generally of chromophobe or hybrid oncocytic histology, while those of TSC are angiomyolipomas. We have recently identified that the tumor suppressors FLCN and Tsc2, germline mutations which cause BHD and TSC syndromes, respectively, require the molecular chaperone heat shock protein-90 (Hsp90) for their stability and activity. We further identified FNIP1 and Tsc1 as new co-chaperones of Hsp90 that help chaperone the tumor suppressors FLCN and Tsc2. The objective of this work was to determine how these new co-chaperones FNIP1 and Tsc1 cooperate in the chaperoning of mutated FLCN tumor suppressor, like that in BHD syndrome.

**Methods:** Both wild-type (WT) and mutated FLCN constructs were transiently expressed and isolated from HEK293 cells. Interacting proteins were identified by co-immunoprecipitation. The stability of mutated FLCN was monitored by Western blot in the presence of increased levels of FNIP1 and Tsc1.

**Results:** We demonstrate that while WT FLCN protein depends on interaction with FNIP1 co-chaperone for its chaperoning by Hsp90 and stability there is an ability of Tsc1 to compensate for FNIP1 when a C-terminally truncating FLCN mutation has abrogated its interaction with FNIP1. In the presence of mutated FLCN, Tsc2 stability is affected as a result of competition between these tumor suppressors for Tsc1 co-chaperone binding and subsequent essential chaperoning by Hsp90.

**Conclusions:** The new Hsp90 co-chaperone Tsc1 is able to compensate for FNIP1 in the chaperoning of mutated FLCN. We additionally have identified a patient with germline mutation in the tumor suppressor FLCN causing BHD syndrome who presented with a renal angiomyolipoma, a tumor characteristic not of BHD but of TSC syndrome. While previous reports of phenotypic overlap between these two syndromes speculate that mTOR signaling lies at the heart of their molecular similarities we provide evidence that the BHD and TSC pathways may work cooperatively through the function of the Hsp90 molecular chaperone.

### MP1-18

#### Tsc1 co-chaperone expression augments bladder cancer response to Hsp90 inhibitors

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SUNY Upstate Medical University

**Introduction:** The molecular chaperone Heat shock protein 90 (Hsp90) is essential for the folding, stability and activity of several drivers of oncogenesis. Hsp90 inhibitors are currently under clinical evaluation in cancer patients, however, their efficacy is limited by lack of biomarkers to optimize patient selection. We have recently identified the tumor

suppressor tuberous sclerosis complex 1 (Tsc1) as a new co-chaperone of Hsp90, which sensitizes cancer cells to Hsp90 inhibitors. Highly variable mutations of TSC1 have been previously identified in bladder cancer and made these cells less sensitive to the Hsp90 inhibitors.

**Methods:** Short-interfering RNA knockdown or transient transfection of Tsc1 was used to modulate Tsc1 levels in bladder cancer cell lines. The ATP-competitive Hsp90 inhibitor ganetespib and histone deacetylase (HDAC) inhibitor citarinostat were used to challenge bladder cancer cell lines. Cell proliferation was assessed by MTT assay. Apoptosis was assessed by immunoblotting.

**Results:** Tsc1 expression results in Hsp90 inhibitor accumulation and sensitivity in bladder cancer. Loss of TSC1 cause hypoacetylation of Hsp90-K407/K419 and decrease binding to the Hsp90 inhibitor ganetespib. Pharmacologic inhibition of histone deacetylases (HDACs) restores hyperacetylation of Hsp90 and sensitizes Tsc1-mutant bladder cancer cells to ganetespib, resulting in apoptosis.

**Conclusions:** TSC1 status can predict response to Hsp90 inhibition in bladder cancer patients. Pharmacologic inhibition of HDACs in bladder cancer cells that lack TSC1 provides a strategy for enhancing the efficacy of Hsp90 inhibitors. Combination of these treatments demonstrates a synergistic effect to induce apoptosis in bladder cancer cells.

### MP1-19

#### Persistent opioid use among patients with kidney stones: A population-based study

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Queen's University

**Introduction:** Kidney stones are a painful condition in which opioids are often prescribed. The risk of new persistent opioid use following an initial presentation for kidney stones, however, is not known. The objective of our study was to describe rates and risk factors for persistent opioid use in stone patients.

**Methods:** We performed a cross-sectional population study of all patients diagnosed with urolithiasis in Ontario between July 1, 2013 and September 30, 2017 using validated administrative databases. Our primary outcome was persistent opioid use defined as dispensing of opioid prescriptions between 90 and 180 days after initial stone visit. Univariate and multivariate logistic regression and Cox proportional hazard models were used to identify factors associated with persistent opioid use.

**Results:** Of the 101 896 previously opioid-naïve patients identified, 66% were prescribed opioids for urolithiasis and 9% had persistent use. The number needed to harm from any initial opioid prescription for development of persistent opioid use was 35. Rates of persistent opioid use were 33% higher among those initially prescribed opioids (odds ratio [OR] 1.5; 95% confidence interval [CI] 1.42–1.58;  $p < 0.0001$ ). In adjusted analysis, increasing age, higher comorbidity index, lower income quintile, increased duration and amount of opioids prescribed in the initial period, more frequent visits to the emergency department or family practitioner, and need for surgery were all associated with increased risk of persistent opioid use (Table 1; all  $p < 0.0001$ ). In those who had surgery, need for repeat procedure and shockwave lithotripsy (SWL) compared to ureteroscopy were associated with increased persistent opioid use (Table 2; all  $p < 0.0001$ ). Delayed surgery (30 days or more after index urolithiasis visit) was not associated with increased persistent opioid use. Rates of opioid addiction, overdose, and hyperalgesia were 0.09%, 0.12%, and 0.3%, respectively.

**Conclusions:** Despite increasing awareness of the risks associated with opioid prescription, the majority of urolithiasis patients were prescribed opioids and 9% of previously opioid-naïve patients demonstrated persistent opioid use 90–180 days after initial urolithiasis visit.

This paper has figures, which may be viewed online at: <https://www.eventscribe.com/2019/nsua/SearchByBucket.asp?pf=Track>



## MP1-20

### National surgical trends in benign prostatic hyperplasia/lower urinary tract symptoms (BPH/LUTS)

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**Introduction:** Benign prostatic hyperplasia/lower urinary tract symptoms (BPH/LUTS) is a chronic disease causing significant morbidity and quality of life impairment among older men. While medical therapy is commonly used, surgical management is often reserved for refractory disease. We assessed trends in the surgical management of BPH in men with Medicare and private insurance.

**Methods:** As part of the Urologic Diseases in America (UDA) project, men aged 65 with BPH insured by Medicare (CMS Medicare 5% Sample) with full Part D coverage or aged 40–64 with private insurance (patient data de-identified Optum<sup>®</sup> Clinformatics<sup>®</sup> Data Mart) from 2004–2013 were identified using ICD-9-CM codes. The percentage of patients who underwent surgery to treat BPH throughout the study period was examined.

**Results:** Age group is related to rates of surgery for BPH (Fig. 1). Among the Medicare population, surgical procedures for BPH decreased in total and on a per-patient basis. BPH procedures decreased by 24.2%, with 4.5% of patients having surgery in 2004 compared to 2.8% in 2013. Among the privately insured patients, surgery for BPH was less common and mildly decreased during the study timeframe, from 2.1% in 2004 to 1.7% in 2013.

**Conclusions:** Over a 10-year span, there was a dramatic reduction in rates of surgical therapy for BPH.

*This paper has figures, which may be viewed online at: <https://www.eventscribe.com/2019/nsaua/SearchByBucket.asp?pfp=Track>*

## MP1-21

### National prescribing trends in benign prostatic hyperplasia/lower urinary tract symptoms (BPH/LUTS)

D. Swerdloff<sup>1</sup>, B. Matlaga<sup>2</sup>, L. Feinstein<sup>3</sup>, J. Ward<sup>5</sup>, Z. Kirkali<sup>4</sup>, C-W. Fwu<sup>5</sup>, K. McVary<sup>6</sup>, C. Welliver<sup>1</sup>

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**Introduction:** Benign prostatic hyperplasia/lower urinary tract symptoms (BPH/LUTS) is a chronic disease causing significant morbidity and quality of life impairment among men. Medical therapy is the most common initial intervention. We assessed trends in medical management of BPH/LUTS with private and Medicare insurance.

**Methods:** As part of the Urologic Diseases in America (UDA) project, men with BPH aged 40–64 with private insurance (patient data de-identified Optum<sup>®</sup> Clinformatics<sup>®</sup> Data Mart) or aged 65 with Medicare (CMS Medicare 5 Percent Sample) with full Part D insurance from 2004–2013 were identified using ICD-9-CM codes. The percentage of patients receiving BPH-related prescriptions was assessed on a yearly basis over the study period and broken down by five-year age groups.

**Results:** Use of medical BPH therapy increased throughout the study period. The figure demonstrates that the proportion of patients who filled prescriptions directly relates to age, with up to 67.1% of men aged 85+ filling prescriptions in 2013. Furthermore, medical management of BPH increased more for men with private insurance as compared to Medicare (14.0% vs. 4.5%) over the study period.

**Conclusions:** Over a 10-year period, BPH was increasingly managed with medical therapy. This increase was especially pronounced among younger men with private insurance.

*This paper has figures, which may be viewed online at: <https://www.eventscribe.com/2019/nsaua/SearchByBucket.asp?pfp=Track>*

## Moderated Poster Session 2: Pediatrics and Trauma

### MP2-01

#### 24-hour urine collection for pediatric stone formers: Is it worth it?

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Albany Medical Center

**Introduction:** The incidence of nephrolithiasis in children is increasing and is now 50 per 100 000 adolescents in the U.S. The AUA guidelines state one or two 24-hour urine collections should be performed for motivated first-time stone formers and, given that children have a lifetime for potential recurrences, metabolic workup has been recommended. Yet 24-hour urine collections can be problematic, especially in children. We sought to study the benefits of 24-hour urine collections in children with stones.

**Methods:** We performed a single-center, retrospective chart review of all pediatric nephrolithiasis patients <18 years of age at Albany Medical Center who supplied a 24-hour urine collection between 8/2000 and 10/2018. Standard recommendations for all patients included reducing salt intake, increasing fruits/vegetables, normal calcium intake, restricting animal protein and oxalate, and increasing fluids, especially those containing citrus. We assessed the 24-hour urine results for abnormalities and then for whether the results led to a change in management.

**Results:** Seventy pediatric nephrolithiasis patients who had 24-hour urine collection were reviewed. Recommendations other than standard dietary and fluid intake changes were made in 8/70 (11%). One was placed on dietary dairy/calcium restriction, two were placed on hydrochlorothiazide and seven on potassium citrate. A low citrate/calcium ratio (327 vs. 525;  $p < 0.03$ ) and whether the test was ordered by nephrology vs. urology (26% vs. 2%;  $p < 0.003$ ) were predictive of an additional recommendation. Of the eight patients who had changes recommended, only 1/8 had a repeat 24-hour urine collection, 3/8 never followed up, and 2/8 stopped the medicines prior to follow up; 55% of the studies were incorrectly collected, and total costs are estimated between \$9800 and \$28 000.

**Conclusions:** 24-hour urine collection for first-time pediatric stone formers is expensive, difficult to accomplish, and infrequently leads to treatment changes. Our data suggest it is unnecessary.

### MP2-02

#### Do children with hypospadias have a small penis?

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Albany Medical Center

**Introduction:** Glans size is thought to be important in the outcome of hypospadias repair, yet there are few standards for glans size in hypospadias. Further, the limited data available focus on glans width and do not take into consideration that the glans is three-dimensional. In addition, there are limited data on penile length in hypospadias patients or normal glans size in children without hypospadias.

**Methods:** After obtaining IRB approval, we prospectively collected pre-operative glans and penile measurements in the operating room under anesthesia. Glans measurements included width (lateral), depth (dorsal to ventral), and glans length (proximal to distal) using calipers prior to placement of a stay suture. Stretched penile length was measured with a surgical ruler. To calculate volume, the formula for a truncated cone with an elliptical base was used [ $\text{glans volume} = (1/3)(\text{width})^2(\text{height})/2(\text{length})$ ]. Regression analysis was used to compare glans and penile measurements vs. age between patients with and without hypospadias.

**Results:** A total of 113 consecutive boys whose parents consented were evaluated with glans and penile measurements in the operating room. Mean age was 19.3 ( $\pm 16.5$ ) months. Of these patients, 56 (50%)

had hypospadias. Adequate data to calculate volume was collected in 40 patients with hypospadias and 56 in the non-hypospadias patients. On regression analysis, for boys <72 months, hypospadias patients had a larger glans volume than normal patients (Fig. 1a;  $p < 0.005$ ), larger width (Fig. 1b;  $p < 0.001$ ), and depth (Fig. 1c;  $p < 0.01$ ), while there was no difference in penile (Fig. 1d) or glans length. Patients with undescended testicles had measurements that were no different than controls and therefore were included in the control group for analysis.

**Conclusions:** Our data illustrate that hypospadias glans volume is greater than that of the non-hypospadias patient, driven by the larger width and depth of the glans in the hypospadias patient, while both penile and glans length were no different. Future directions include evaluating patients who have received testosterone for a small glans preoperatively and to determine the effect of glans volume on outcomes.

*This paper has figures, which may be viewed online at: <https://www.eventscribe.com/2019/nsaua/SearchByBucket.asp?pfp=Track>*

### MP2-03

#### Improving clinician-to-parent communication after hypospadias surgery by creating standardized discharge instructions in Epic: A quality improvement initiative

K. Milford, M. Koyle, M. Pokorowski

SickKids Hospital

**Introduction:** When Epic (Epic Systems Corporation) was introduced as the Electronic Medical Record System at SickKids, no standardized discharge instructions (DI) were available for issue after hypospadias repair. Furthermore, clinicians were unfamiliar with Epic and its functionality. An observational study conducted during Epic rollout month found frequent observed discrepancies in information given to caregivers by operating surgeons and post-anesthetic care unit (PACU) staff after day-case surgery. This quality improvement project aimed to improve clinician-to-parent communication after hypospadias surgery by creating Epic SmartPhrases, to be used to generate DI standardized to each operating surgeon. These DI would be issued to caregivers in printed form, and referred to by PACU staff when issuing verbal instructions. Our goal was to increase the number of patients discharged after hypospadias surgery with standardized DI to more than 90% within six months.

**Methods:** Surgeon-specific post-hypospadias DI SmartPhrases were created. Key stakeholders included staff surgeons (required to provide content of individualized DI SmartPhrases); trainees (responsible for uploading appropriate SmartPhrases to the DI section of charts); and PACU staff (requested to issue verbal instructions according to printed DI). PDSA cycles were instituted to assess an act on the effectiveness of SmartPhrase DI usage.

**Results:** The percentage of standardized DI increased from 0% in July 2018 (pilot study period) to 100% in February 2019 (six months after the creation of the first DI SmartPhrases). The percentage comprehensive DI increased from 57% to 100% over the same period (Fig. 1).

**Conclusions:** Changing a hospital's record-keeping system can result in unanticipated consequences, including a change in the quality of clinician-to-patient communication. Regarding Epic, postoperative standardized and comprehensive DI can be produced through the use of the SmartPhrase facility. In addition, these DI are easily disseminated and applied to patient charts. Creation of SmartPhrases improves both comprehensiveness and standardization of DI.

*This paper has figures, which may be viewed online at: <https://www.eventscribe.com/2019/nsaua/SearchByBucket.asp?pfp=Track>*



**MP2-04****Gastroschisis and cryptorchidism: A multi-departmental, single-institution experience**

A. Sansosti, F. Schneek, S. Shaffiey, R. Chaudhry, M. Killian

University of Pittsburgh Medical Center

**Introduction:** An association between gastroschisis and cryptorchidism is well-described in the literature. The safest approach for attempted orchiopexy in patients with gastroschisis is an ongoing debate in the pediatric surgical community. Additionally, various reports have suggested that many cases of cryptorchidism spontaneously resolve with age, eliminating the need for surgical intervention. We sought to characterize the differences in surgical practices between pediatric surgery and pediatric urology for treatment of cryptorchidism in patients with gastroschisis at a single, tertiary care institution.

**Methods:** Male patients treated at our institution for gastroschisis and cryptorchidism were identified using a search program (BlueZone Marsä) from the electronic medical record (EMR). Data were collected on timing of testicular operation (TTO), surgical specialty (pediatric general surgery [PGS] vs. pediatric urology [PU]), type of procedure performed (orchiectomy, orchiopexy, or diagnostic laparoscopy), laterality, significant comorbidities (SC), and surgical approach (inguinal, abdominal, or two-staged Fowler-Stevens).

**Results:** A total of 565 patients with surgical intervention for gastroschisis were identified. Of these, 25 were identified as having cryptorchidism; 22 patients were included in our final analysis after excluding three patients who had not undergone testicular surgery. Fourteen operations were performed by PGS and eight by PU. Mean gestational age (GA) for the entire sample was 35.7 weeks (standard deviation [SD] 1.81, range 32–38). There was no significant difference ( $p=0.52$ ) in GA between the PGS population ( $36.1\pm1.57$  weeks) vs. PU ( $35.4\pm2.19$  weeks). There was no significant difference ( $p=0.53$ ) between GA of patients with SC ( $35.2\pm2.04$  weeks) and those without ( $36.1\pm1.57$  weeks). Average TTO was not significantly different ( $p=0.24$ ) between PGS ( $79.8\pm69.0$  weeks) and PU ( $133.5\pm139.6$  weeks). SC showed no association to TTO ( $p=0.29$ ). PGS and PU did not differ in surgical approach ( $p=0.13$ ) or by procedure performed ( $p=0.98$ ). There was no association of SC with procedure performed ( $p=0.42$ ) or surgical approach ( $p=0.34$ ). There was not a significant difference in SC between the children operated on by PGS vs. PU ( $p=0.51$ ).

**Conclusions:** At our institution, PGS and PU share patients with gastroschisis and cryptorchidism. From our findings, PGS and PU treat similar populations of patients and do not differ in surgical approach to cryptorchidism. More research must be conducted in order to better characterize outcomes of the various approaches in this specific population in order to recommend the safest and most effective approach.

**MP2-05****The implementation of Choosing Wisely recommendations for cryptorchidism by a Canadian children's hospital results in an overall reduction of scrotal ultrasounds being performed**

K. Psooy, M. Reed

Winnipeg Children's Hospital/University of Manitoba

**Introduction:** Choosing Wisely (CW) 2013/2017 and Choosing Wisely Canada 2014 both recommend against the routine ordering of scrotal ultrasound (US) for boys with cryptorchidism. In 2016, the Department of Diagnostic Imaging at the Children's Hospital in Winnipeg decided to implement this recommendation with a new policy that was approved and endorsed by the hospital's radiologists, pediatric surgeons, and urologists. A letter was sent to all pediatricians informing them of the CW recommendation, and providing additional recommendations regarding the timing of referrals for the surgical management of cryptorchidism. Thereafter, any requisition for an US examination for cryptorchidism from a pediatrician or a family practitioner was returned to the referring physician along with a copy of the same letter. The objective of this study is to determine if the implementation of this new policy resulted in an overall reduction in the number of ultrasound examinations for cryptorchidism.

**Methods:** All US performed on boys 10 years and under in the department during the years 2014 and 2015 (pre-implementation) and 2017 and 2018 (post-implementation) were reviewed to determine US type and indication. The total number of scrotal US for cryptorchidism was recorded. The ordering physician for each ultrasound for cryptorchidism was categorized as pediatrician, family physician, or surgeon (which included both pediatric surgeons and urologists).

**Results:** The average number of scrotal US being performed for cryptorchidism was 57/year prior to implementing the policy and dropped to 27/year following implementation of the policy. However, the average number of scrotal US being ordered/year by surgeons did not increase following implementation of the policy.

**Conclusions:** A simple method of implementing the recommendations of Choosing Wisely resulted in a substantial overall reduction in the number of scrotal US performed for cryptorchidism and did not lead to an increase in the number of scrotal US being ordered by the surgeons being consulted. Therefore, this study affirms that the Choosing Wisely recommendations appropriately target the reduction of unnecessary scrotal US from being ordered.

**MP2-06****Robotic-assisted laparoscopic appendicovesicostomy for a young patient with Down's syndrome and chronic urinary retention**

J. Villanueva, M. Killian, A. Sansosti, D. Rogers, R. Chaudhry

University of Pittsburgh Medical Center

**Introduction:** We would like to present a description of our technique performing a robotic-assisted laparoscopic appendicovesicostomy (APV) for urinary retention with associated renal dysfunction. The patient is a 13-year-old male with trisomy 21 and multiple comorbidities including constipation, Down's Syndrome, and type 1 diabetes mellitus. He was initially admitted for worsening renal function, hydronephrosis, and elevated post-void residuals greater than 500cc despite optimal treatment of comorbidities. He failed attempts at clean intermittent catheterization (CIC) and his workup revealed no evidence of bladder outlet obstruction.

**Methods:** We have a da Vinci SI at our institution. The patient was positioned, prepped, and draped in the usual fashion. An umbilical port and three robotic ports were placed in the standard fashion. Notably, the umbilical port entered the fascia at about 2 cm caudal to the skin incision as it was the planned site of the cutaneous end of the APV. After the cecum was mobilized, a small window was created between the appendiceal and cecal mesentery. The appendiceal mesentery was isolated and its artery was identified. An Endo-GIA 30 mm load was used to ligate the appendicocolic junction. The mesentery was mobilized by incising its overlying peritoneum. The distal and proximal ends of the appendix were opened and were cannulated with a 10 French feeding tube. The bladder was then mobilized to facilitate implantation. A detrusor trough was created, entering the bladder mucosa inferiorly. The appendiceal to bladder anastomosis was performed with interrupted 4-0 vicryl sutures over the catheter. 3-0 vicryl sutures were used to close the detrusor muscle over the appendix, yielding a tunnel length of about 4 cm. The stoma was created by grasping the cutaneous end of the channel through the camera port. It was then externalized to the skin where it was spatulated and then matured using 4-0 vicryl. The APV catheter was exchanged for a 12 Fr catheter, which was passed multiple times without difficulty.

**Results:** Total operative time, including port placement and skin closure, was 330 minutes. Estimated blood loss was 25 cc. The APV catheter was removed at postoperative week 4, at which point CIC every three hours via the APV was started. The patient's renal function returned to baseline and he remains dry without any postoperative complications or difficulty with catheterizations at one year followup.

**Conclusions:** Robotic-assisted laparoscopic appendicovesicostomy can be performed safely and effectively in select pediatric patients. This procedure has resolved the patient's renal dysfunction by allowing CIC in a sensate patient who does not tolerate transurethral catheterizations.

**MP2-07****Novel genetic abnormalities associated with hypospadias**

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University of Pittsburgh Medical Center

**Introduction:** Hypospadias is a relatively common congenital anomaly affecting male urogenital development. It is etiologically heterogeneous, where genetics and environment contribute to its formation. Describing new genetic alterations associated with hypospadias adds to our understanding of its etiology and expected associated anomalies.

**Methods:** After IRB approval, a retrospective chart review of boys with a diagnosis of hypospadias who had undergone genetic testing at our institution was performed. Children are tested if they have multiple associated congenital issues. Peripheral blood was analyzed using G-banding chromosome analysis, whole genome and high-resolution X chromosome-specific microarrays. Patient charts were also reviewed for severity of hypospadias, medical and surgical history, family history of genitourinary (GU) anomalies, and whether or not the boy was a product of in vitro fertilization (IVF).

**Results:** Thirteen boys with a hypospadias were screened for genetic anomalies. Four were found to have genetic anomalies. This included three patients with X chromosomal alterations detected by comparative genomic hybridization microarray and an additional patient with partial trisomy for the 9q33.1q43.13 region. The remaining nine patients had normal genetic testing. Meatal locations were as follows: four glanular, four coronal, two penile shaft, three scrotal/penoscrotal. Of those with a penoscrotal location, 2/4 were found to have a genetic anomaly (PH-1, PH-4). Eight boys underwent a hypospadias repair, with an average of 1.6 surgeries. Two received a planned two-staged repair. Notably, only one child in the cohort (PH-1) required an unplanned corrective surgery (total=3); he has a personal and family history of suspected Ehlers-Danlos syndrome. Testes were descended in 10/13. In patient PH-4, both testes were non-palpable. Two additional patients with negative genetic testing had abnormal testicular location: one had bilateral suprascrotal testes and another had a unilateral suprascrotal testis. There was no family history of GU anomalies and none were the result of IVF.

**Conclusions:** Chromosomal aberrations were detected in 4/13 (30.7%) patients in our cohort, including submicroscopic abnormalities in 3/4 patients. Interestingly, the X chromosome microdeletions and microduplications were present in three patients. Pathogenic sequence variants in the *MAMLD1* gene were reported previously, however, our patients represent the first case with pathogenic deletion. This retrospective study is limited by its sample size. However, it describes three genetic alterations not previously associated with hypospadias. This finding may improve our understanding of hypospadias development.

*This paper has figures, which may be viewed online at: <https://www.eventscribe.com/2019/nsaua/SearchByBucket.asp?pf=Track>*

**MP2-08****Recurrent penile adhesions in patients with lichen sclerosis: A multi-institutional experience with sub-coronal resurfacing using buccal mucosal graft belt**

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**Introduction:** Recurrent penile adhesions associated with lichen sclerosis (LS) may cause pain, bleeding, and disfigurement. We present a novel surgical technique for treatment of refractory penile adhesions using a sub-coronal buccal mucosal graft (BMG) resurfacing.

**Methods:** A retrospective, international, multi-institutional study was conducted to include patients with refractory penile adhesions who were treated with this technique. The procedure included circumferential excision of the diseased skin segment and replacing it with a circumferential 1 cm strip of BMG. Patients with less than one-year followup were excluded. The primary outcomes were recurrence and surgical complications. Secondary outcomes were patient-reported outcomes measures

(PROMS), including Sexual Health Inventory for Men (SHIM) questionnaire and global response assessment (GRA) questionnaire administered to measure functional and esthetic outcomes. The GRA scale ranges from -3 (markedly worse) to +3 (markedly improved).

**Results:** Sixteen men with a mean age of 61 years (46–74) underwent the procedure in five institutions between 3/2014 and 3/2018. Twelve men with more than one-year followup met inclusion criteria. Prior treatments included topical agents (5/12), oral agents (2/12), and circumcision (5/12). Histologically proven LS was the most common etiology (8/12). At the mean followup of 21 months (13–72), no patients developed recurrence. Mean SHIM score remained unchanged at 15 (p=0.83). Overall improvement of symptoms on GRA was reported by all patients: 50% GRA+3; 25% GRA+2; 25% GRA+1. All patients saw improvement in pain with intercourse: 33% GRA+3; 17% GRA+2; 50% GRA+1. Ten patients (83%) reported an improvement in esthetic appearance, one patient reported no change, and one patient mild worsening. Baseline penile sensation was preserved in 9/12 (75%). The majority would recommend the procedure to a friend/relative (11/12, 92%).

**Conclusions:** Refractory penile adhesions in the setting of LS are notoriously difficult to treat. A sub-coronal BMG resurfacing is feasible. This initial patient cohort demonstrated no recurrence and overall high satisfaction. A prospective study with long-term followup is warranted.

**MP2-09****Walt Whitman, John Mahay, and urotrauma in the American Civil War**

M. Witthaus, E. Mathews, M. Rabinowitz, R. Rabinowitz  
University of Rochester

**Introduction:** Walt Whitman (1819–1892) was a visionary American poet who inspired innovation within the literary landscape, choosing to preserve real, complex life with poetic imagery. He also chose to volunteer as a nurse during the American Civil War, daring to confront the violent, painful reality of war's aftermath with precision and unflinching honesty. Our objective is to investigate the urologic management and perspectives of Walt Whitman during his service as a nurse during the American Civil War.

**Methods:** We conducted a review of the literature pertaining to Walt Whitman, his clinical practice, and his relationship to John Mahay during the Civil War. A review of textbooks, peer-reviewed articles, works of prose, and government archives was performed. Original publications and anatomic diagrams were reviewed through the Walt Whitman Archive and the National Museum of Health and Medicine.

**Results:** During the Civil War, Whitman cared for numerous patients, including Private John Mahay, who sustained a penetrating GU injury during the second battle of Bull Run (August 29, 1862). He passed several bone fragments per urethra, suggesting a pelvic fracture urethral injury (PFUI). Mahay continued his chronic urologic care with Walt Whitman. The entry and exit wounds resulted in fistulas to the urinary tract with documented blood, pus, and urine drainage (Fig. 1). Mahay died (October 24, 1863) after nearly a year of chronic urologic care. Several urinary stones were removed from Mahay's bladder on autopsy. Whitman recalled Mahay's life and death: "The bladder had been perforated by a bullet going entirely through him. Not long since I saw a good part of the morning by his bedside, Ward E, Armory-square. The water ran out of his eyes from the intense pain, and the muscles of his face were distorted, but he uttered nothing except a low groan now and then. Hot moist cloths were applied, and relieved him somewhat. Poor Mahay, a mere boy in age, but old in misfortune."

**Conclusions:** Walt Whitman's Civil War writings chose to confront reality with honesty, precision, and eloquence. His commitment to John Mahay's care during the Civil War underscores the essential human aspects involved in acute and chronic urologic care following traumatic injury. *This paper has figures, which may be viewed online at: <https://www.eventscribe.com/2019/nsaua/SearchByBucket.asp?pf=Track>*

**MP2-10****The history of genitourinary blast trauma**

M. Witthaus, E. Mathews, R. Rabinowitz  
University of Rochester

**Introduction:** An explosive is a device designed to inflict injury through generating significant thermal damage, projectile debris, and shockwave force following detonation. The combination of clinical findings can be described comprehensively as a blast injury. We investigated the historical relationship between blast trauma and the evolution of genitourinary (GU) trauma care.

**Methods:** We conducted a review of the literature pertaining to GU injury with particular focus on key terms: blast injury, GU trauma, and battlefield medicine. A review of textbooks, peer-reviewed articles, Department of Defense records, and Centers for Disease Control archives was performed.

**Results:** The first explosives in warfare were used in ancient China during the Tang dynasty (circa 618–907 CE). The Revolutionary and Civil Wars had infrequent explosive blast conflicts with urotrauma accounting for less than 1% of injuries. Civil War GU trauma frequently relied on diverting urine by perineal urethrostomy or suprapubic cystostomy. Artillery in World War I was responsible for two-thirds of all battle casualties and significantly increased the incidence of GU injury. During this time, renal injuries were seldom surgically repaired, resulting in high mortality rates. World War II (WWII) marked the incorporation of antibiotics and muscle flaps to cover GU injuries. Nuclear blast injury was introduced during WWII, with the subsequent addition of radiation-induced GU sequelae. Vascular reconstructive techniques were first introduced during the Korean War. Landmines in the Korean and Vietnam Wars marked further increases in GU injuries but correlated with decreased overall mortality due to improved expeditious care with the use of mobile army surgical hospital (MASH) units and helicopter evacuation. The advent of Kevlar body armor during the Bosnian War decreased overall casualties but also led to an increase in the incidence of external genitalia blast injuries. This trend continued, with nearly three-quarters of battle injuries being due to an explosive mechanism during U.S. involvement in Afghanistan and Iraq. The resulting complex cases used the technique of phallic reconstruction and the eventual first penile scrotal transplantation due to GU trauma.

**Conclusions:** Over the centuries, the increased incidence of GU blast trauma has coincided with advances in technological warfare. The advances in warfare are juxtaposed with improved surgical technique, technological innovations, and improved urologic care.

**MP2-11****Management of genitourinary foreign bodies in a predominantly incarcerated population**

T. Maers, D. Abramowitz, J. Bodkin, III  
University at Buffalo

**Introduction:** Urethral foreign body insertion is rarely reported in the literature. Commonly reported reasons for insertion include autoeroticism and intoxication, however, psychiatric illness is thought to play a role in most cases. In the incarcerated population, malingering is thought to play a prominent role. Management is dependent on location of the foreign body, size, and mobility. Locally, the incidence of urethral foreign body insertion has increased dramatically. As this entity is not well-described, we sought to examine cases of urethral foreign body insertion in our patient population.

**Methods:** We performed a retrospective review of all patients presenting to Erie County Medical Center with a urethral or bladder foreign body between January 2001 and March 2019. Patient demographics, presentation, workup, and management were reviewed. This study was completed with approval from our institutional review board.

**Results:** Forty-eight separate patients presented with a urethral or bladder foreign body and collectively there were 123 distinct encounters identified. Median patient age was 33 years (range 21–93). Forty-four patients were male and four were female. Thirty-two patients (66.7%) were incarcerated and 31 patients (64.6%) had at least one documented psychiatric comorbidity. Reported reasons for urethral foreign body inser-

tion included intentional self-harm, hearing voices, depression or anxiety, sexual pleasure, anger, and attempts to avoid returning to correctional facility. Concomitant foreign body ingestion was present in 56 encounters (45.5%). Pelvic imaging was obtained in 81.3% of encounters. The most commonly employed methods of foreign body extraction included flexible cystoscopy (35.2%), rigid cystoscopy (20.4%), extrinsic pressure (19.7%), and spontaneous passage (5.6%). Intervention was either declined or not performed in 13 encounters (9.1%). Anesthesia was required during 51 encounters (41.5%). Forty-seven patient encounters (38.2%) required admission. In admitted patients, median length of stay was two days (range 1–36).

**Conclusions:** Genitourinary foreign body insertion may be more common than previously described, especially within the incarcerated population. Surgical intervention and admission are often required, representing a significant economic burden within the local healthcare system. Many ethical questions are raised regarding the care and safety of the incarcerated population.

**MP2-12****Genitourinary foreign bodies in incarcerated patients: Patient cry for help or a system in crisis?**

D. Abramowitz, T. Maers, A. Myneni, E. Noyes, J. Bodkin, III  
University at Buffalo

**Introduction:** The U.S. has approximately 1% of its total population incarcerated, with an estimated 50% of these individuals carrying a mental health diagnosis. Of these, only half receive any form of mental healthcare while imprisoned. The number of emergency room visits have been increasing for cases of self-harm among those who are incarcerated. Herein, we completed an economic evaluation of the system-wide costs associated with management of genitourinary (GU) foreign bodies in a prison population and estimated cost-effectiveness of enhanced behavioral services for this at-risk group.

**Methods:** Under IRB approval, we used electronic medical records for a county hospital responsible for providing medical services for the region's correctional facilities from 2004–2019. Incarcerated patients with self-placed foreign bodies into the GU tract were identified using ICD codes. The healthcare resources used for each case were itemized and priced out using the publicly reported hospital service charges and Medicaid reimbursement schedule for physician services. The resources used for inmate transportation and hospital monitoring from those employed by the Department of Corrections were priced out using the State Department of Labor data for salary and wages.

**Results:** A total of 118 unique visits to the emergency department were identified over the 15 years, with 78 of them occurring in the last two years. Incarcerated patients with at least one GU foreign body admission between January 2017 and March 2019 had an average cost of \$26 545 in healthcare costs and \$1377 in transportation-related costs. That is compared to \$1000 allocated per prisoner per year under the Department of Corrections current healthcare contract. In the last two years only, the Department of Corrections paid \$663 610 in healthcare costs for frequent-flyer self-harm patients, which is equivalent to the resources needed to cover 7–10 full-time behavioral therapist positions.

**Conclusions:** This is the first empirical study that provides evidence of financial and clinical feasibility of shifting the current paradigm of care delivery for incarcerated patients with mental health issues in state correction facilities from acute problem management and emergency services to prevention and a mental health hygiene model. Investing in preventive services could improve prisoners' quality of life, in addition to alleviating financial burden of predictably avoidable healthcare costs.



## Moderated Poster Session 3: Oncology: Bladder, Renal, Testes

### MP3-01

#### Clinical practice patterns of immediate intravesical chemotherapy following transurethral resection of bladder tumor

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University of Ottawa

**Introduction:** Current evidence supports the use of a single postoperative dose of intravesical chemotherapy following bladder tumor resection for non-muscle-invasive bladder cancer (NMIBC). However, several studies have demonstrated a wide variation in the utilization of postoperative intravesical chemotherapy in various health jurisdictions around the globe. Our goal was to assess current practice patterns among urologists in the Canadian healthcare system with regard to postoperative chemotherapy instillation.

**Methods:** Our study was approved by the institutional review board. An electronic questionnaire was distributed to urologists across Canada via email in June 2018. An initial invitation to participate was followed by two reminder emails. Statistical analysis was performed on the collected data.

**Results:** A total of 130 urologists completed our survey. The overall response rate was 17.6% and included urologists from all 10 Canadian provinces; 43.1% of respondents work in academic settings and 22.3% were urologic oncology fellowship-trained. Most (76.9%) respondents perform 2–10 transurethral resections of bladder tumor (TURBTs)/month. The median years in practice was 10 (interquartile range [IQR] 7.5–16.25). Eighty-one urologists (62.3%) send urine culture before TURBT. Forty-nine (37.9%) do not use intravesical chemotherapy post-TURBT or have rarely used it, and only four (3.1%) use it for all resections. Interestingly, respondents beyond 10 years in practice were less likely to administer intravesical chemotherapy (odds ratio [OR] 0.45;  $p=0.028$ ). Mitomycin C is the primary agent for 60.0% of urologists, followed by epirubicin (19.2%). Common reasons to not administer intravesical chemotherapy included logistical barriers (65.3%), side effects (48.9%), lack of access to agent (22.4%), and a perceived limitation of clinical evidence (22.4%). Sixty-nine (53%) respondents believe that less than 10% of their patients receive intravesical chemotherapy post-TURBT. Moreover, if alternatives to mitomycin C were available with decreased toxicity, comparable efficacy, increased availability, and decreased cost, 78.5% of urologists would consider such agents in their practice.

**Conclusions:** Immediate intravesical chemotherapy instillation following TURBT has been reasonably adopted across Canada. However, if guideline adherence is a measure of healthcare quality, there is a strong need to eliminate logistical barriers to treatment and to address safety concerns regarding intravesical therapy.

### MP3-02

#### Trimodal therapy vs. radical cystectomy for muscle-invasive bladder cancer: A Markov microsimulation model

D. Magee, D. Cheung, A. Hird, S. Sridhar, C. Catton, P. Chung, A. Berlin, A. Zlotta, N. Fleshner, G. Kulkarni  
University of Toronto

**Introduction:** Radical cystectomy (RC) is the historically accepted gold standard treatment for muscle-invasive bladder cancer (MIBC), but trimodal therapy (TMT) has emerged as a valid therapeutic option. These two modalities, however, have not been directly compared. Therefore, we created a decision model assessing the effectiveness of TMT and RC using decision analysis methods.

**Methods:** A two-dimensional Markov microsimulation model was constructed using TreeAge Pro to compare RC and TMT for patients with newly diagnosed MIBC (Fig. 1). Model probabilities and utilities were derived from published literature. Our primary outcome was quality-adjusted life expectancy (QALE). Secondary outcomes included crude life expectancy (LE) and bladder cancer recurrences in the TMT arm. Markov cycle length was dynamic to mimic actual clinical practice. The base case for our model was an adult patient with MIBC (pT2-4 N0 M0) considered appropriate for either RC or TMT. Individual-level sampling was completed for age, gender, and reconstruction type (ileal conduit vs. neobladder) assigned in the RC arm.

**Results:** TMT was the preferred modality, with an estimated mean QALE of 7.49 (95% confidence interval [CI] 6.89–7.86) vs. 7.41 (95% CI 6.95–7.86) for RC but mean LE for patients treated with TMT was lower (10.21 years; 95% CI 9.3–10.7) compared with RC (10.74 years; 95% CI 10.0–11.4). A sensitivity analysis evaluating the impact of age showed that younger patients treated with RC had greater QALE and longer LE than those treated with TMT. However, inverse findings were observed for elderly patients (Table 1). Overall, 39.4% of patients in the TMT arm experienced a bladder recurrence, with 27% undergoing a salvage cystectomy.

**Conclusions:** Our study suggests that RC provides more unadjusted life years than TMT (0.53 years), but lower quality of life (-0.08). Differences in treatment preference were dependent on age. The younger the patients are, the more likely they are to benefit from the oncological control derived from RC.

This paper has figures, which may be viewed online at: <https://www.eventscribe.com/2019/nsaua/SearchByBucket.asp?pf=Track>

### MP3-03

#### Predictors of stent failure for malignant ureteral obstruction from gynecologic malignancies

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University of Pittsburgh Medical Center

**Introduction:** Malignant ureteral obstruction is a complication seen with advanced malignancies, however, there is limited data studying a group of patients with only gynecologic malignancies. Our study aimed to identify the rates and predictors of stent failure in a group of patients with gynecologic malignancies.

**Methods:** Between January 2010 and December 2016, data was retrospectively obtained for 77 patients who were diagnosed with a gynecologic malignant hydronephrosis who had a ureteral stent placed. Demographic data, symptoms, creatinine levels, the location of compression, and progression to nephrostomy tube placement were recorded. Fishers exact, Wilcoxon rank-sum, and Kruskal Wallis test were used for univariable analysis. Logistic regression was then performed on those variables that were significant on univariable analysis.

**Results:** Of the 77 female patients included in the analysis, 32% had a stent failure and went onto require nephrostomy tube placement. Asymptomatic patients who were stented to preserve renal function for nephrotoxic chemotherapy were more likely to fail their stent as compared to those patients who were stented for symptoms or infection ( $p<0.04$ ). Patients who developed sepsis after stent placement were ultimately more likely to end up with stent failure ( $p<0.01$ ); both were also significant on multivariate analysis. Patients with a stent placed for future nephrotoxic chemotherapy and those with sepsis after a stent had

higher odds of stent failure, 5.35 and 6.7 times, respectfully. Patients who had stent failure had a higher median serum creatinine at the time of stent placement (1.8) compared to those who did not fail (1.2) their stent ( $p < 0.046$ ). Among those who had a stent placed for flank pain, most patients (75%) had improvement in their symptoms.

**Conclusions:** Gynecologic malignant hydronephrosis is a challenging condition to treat given the medical complexity of these patients and our desire to balance quality of life with treatment goals. Stent failures are not uncommon and were seen in 32% of our population. Elevated pre-treatment serum creatinine and post-treatment sepsis were predictors of eventual stent failure. Asymptomatic patients who were stented with the indication to preserve renal function for future nephrotoxic chemotherapy were more likely to fail a stent as compared to those patients who presented with pain or infection.

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### MP3-04

#### Minimally invasive vs. open RPLND in the treatment of testicular cancer: A comparison of current practice trends and outcome measures

M. Beamer, S. Gleicher, J. Jacob  
SUNY Upstate Medical University

**Introduction:** Retroperitoneal lymph node dissection (RPLND) is a treatment option for testicular cancer both in the primary and post-chemotherapy setting. Multiple single-institution case series exist that examine outcomes for robotic and laparoscopic surgical approaches. Here, we utilize the National Cancer Database (NCDB) to examine trends in the selection of surgical approach and respective outcome measures on a national level.

**Methods:** The NCDB was used to identify patients that received a RPLND following the diagnosis of testicular cancer. Only patients with data available regarding the surgical approach (robotic, laparoscopic, and open) were included. This included patients from 2010–2015. A minimal invasive group included both robotic and laparoscopic surgeries. This group was compared to open procedures. Demographic information, baseline health characteristic, cancer stage, surgical and survival outcomes were examined. Statistics were performed in SPSS. Student's t-test was used to analyze continuous variable and Chi-squared test was used for categorical variables.

**Results:** A total of 2116 patients received a RPLND between 2010 and 2015. Minimally invasive procedures were performed in 94 patients and 2022 patients underwent an open surgical approach. There was no difference in age (minimally invasive 32.5 year, open 34.1 years), race, insurance, income, distance traveled for surgery, regional population size, or regional education level between groups. There was no difference in Charlson-Deyo score, with the majority of patients receiving a score of 1. Preoperative clinic stage did not play a role in selection of surgical approach. The total number of RPLNDs performed across all five years was stable, with the majority of cases being performed open. There was no significant difference in the number of lymph nodes collected (minimally invasive 28, open 32;  $p = 0.265$ ). The rate of hospital readmission was low, with no significant difference between groups (minimally invasive 4.3%, open 2.9%;  $p = 0.537$ ). Patients in the minimally invasive group tended to have a longer hospital stay (7.66 vs. 5.07 days) but this was not significant ( $p = 0.230$ ). There was no difference in 30-day or 90-day mortality. Kaplan-Meier analysis showed no difference in survival between groups.

**Conclusions:** The number of minimally invasive RPLND surgeries performed for testicular cancer remains small. There appears to be no difference in survival between surgical approaches. In this time period, the minimally invasive cohort did not have decreased hospital stays or readmission rates.

### MP3-05

#### Prevention of benign kidney tumor resection using a combination of routine biopsy and tumor: Cortex peak early-phase enhancement ratio evaluation

A. Cheema, A. Menon, A. Ahmed, T. White, G. James, E. Kauffman  
Roswell Park Comprehensive Cancer Center

**Introduction:** The tumor:cortex peak early-phase enhancement ratio (PEER) using multiphase computed tomography (CT) has been prospectively validated for discerning CD117(+) chromophobe renal cell carcinoma (ChRCC) from CD117(+) oncocytoma (RO). We evaluate the effectiveness of routine preoperative biopsy and PEER evaluation to prevent resection of benign kidney tumors.

**Methods:** We retrospectively reviewed the pathology of all fat poor renal cortical tumors resected over a five-year period by a single surgeon at a National Comprehensive Cancer Care Network institute who used the approach of routine biopsy combined with oncocytic tumor:cortex PEER evaluation to select patients for surgical resection. Biopsy was routinely performed for any renal cortical tumors with suspicion of benign histology. Biopsy showing benign oncocytoma were observed. CD117 positive oncocytic tumors suggestive of oncocytoma were confirmed to be oncocytoma on a tumor:cortex PEER value of more than 0.55. We looked at pathology of all resected renal cortical tumors over a six-year period using this approach to determine the incidence of benign vs. malignant histology. In parallel, we also determined the number of patients with benign renal tumor suggested on biopsy who went on active surveillance and avoided initial resection using this approach. Outcomes of benign tumor on surveillance, including progression and metastasis rates were reviewed.

**Results:** A total 158 patients with a preoperative diagnosis of RCC underwent surgery; 103 (67%) patients were diagnosed as malignant renal tumor on preoperative biopsy. Fifty-two (33%) patients with frank features of malignancy clinically or on imaging directly proceeded to surgery without a biopsy. On review of the final resected tumor histopathology, no instance of resection for a benign tumor was found. One patient with a preoperative diagnosis of spindle cell tumor was found to have epithelioid angiomyolipoma with necrosis and indeterminate malignant potential on final pathology. During the same period, 36 patients were determined to have benign renal tumor on biopsy and PEER evaluation. These patients did not undergo surgery and were placed on surveillance. Over a median followup of 21 months, no patient developed progression or metastasis.

**Conclusions:** A combination of routine biopsy for tumors with potential for benign histology and the PEER approach for discerning CD117(+) oncocytoma from CD117(+) chromophobe RCC is an effective diagnostic tool to avoid resection for benign tumors.

### MP3-06

#### Initial outcomes for universal active surveillance of small renal masses using pre-defined progression criteria for treatment conversion.

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Roswell Park Comprehensive Cancer Center

**Introduction:** Metastatic risk for small renal mass (SRM) patients on active surveillance (AS) is low and often outweighed by treatment morbidity/mortality. Current AS literature is confounded by highly selected SRM patients who are unfit to receive treatment, hence treatment rates and progression criteria for triggering treatment in healthier patients are not well-defined. We report our initial experience with a novel SRM management approach using universal AS and prospectively applied progression criteria to trigger treatment recommendation.

**Methods:** All non-end-stage renal disease patients with SRM tumors presenting from January 2013 to January 2019 to a single urologic oncologist at a National Comprehensive Cancer Network institute were recommended AS if pre-defined progression criteria were not met at presentation. Progression criteria for recommending treatment at presentation or during AS were the absence of biopsied benign tumor histology and presence of longest tumor diameter (LTD)  $> 4$  cm, cT3a stage, growth rate  $> 5$  mm/year or 3 mm/year for LTD  $> 3$  cm, high risk histology (grade/subtype) on biopsy, or symptoms. SRM biopsy was recommended for LTD  $> 2$  cm. Primary outcome measure was one-, two-, and 3-year progres-

sion-free survival (PFS); secondary outcome measure was metastasis-free survival (MFS). Patients with prior renal cell carcinoma (RCC) treatment histories were excluded.

**Results:** Of 127 SRM patients with >3 months followup, four met progression criteria at presentation and were excluded. All remaining 123 SRM patients were managed with AS. Median initial LTD was 2.2 cm (range 0.9–3.9). With median followup of 25 months (range 4–64), 33 (27%) AS patients met  $\geq 1$  progression criterion. One-, two-, and three-year PFS rates were 92%, 73%, and 65%, respectively. Shorter PFS was associated with initial LTD and clear-cell RCC histology on biopsy. Three-year PFS rates were 30% for LTD >3 cm, 75% for 2.1–3 cm, and 79% for <2 cm. Twenty-seven of 33 (82%) progressing patients received treatment (26 surgery, one ablation); only one (1%) non-progressing patient converted to treatment. Benign tumor resection incidence was 0%. Most (62%) resected RCC tumors had high-grade (50%) and/or pT3a stage (27%) pathology. MFS for progressing and non-progressing patients was 100%.

**Conclusions:** Universal AS for SRM patients using defined progression criteria avoids resection for many patients with initial LTD <3 cm, enriches for adverse pathology resection, prevents benign tumor resection, and improves overall identification of indolent vs. more aggressive tumors for treatment selection. Additional followup is needed to assess long-term PFS and oncologic safety.

### MP3-07

#### Cost of muscle-invasive bladder cancer treatment: Phase-specific costs of trimodal therapy compared with radical cystectomy

D. Magee, D. Cheung, A. Hird, A. Berlin, C. Catton, P. Chung, S. Sridhar, A. Zlotta, N. Fleshner, G. Kulkarni

University of Toronto

**Introduction:** Radical cystectomy (RC) is the gold standard treatment for muscle-invasive bladder cancer, but trimodal therapy (TMT) has been increasing in popularity for appropriately selected patients. As two therapeutic modalities are now well-accepted, we sought to evaluate the micro-level costs associated with RC and TMT in adults with bladder cancer.

**Methods:** All patients undergoing TMT or RC for primary treatment of urothelial bladder cancer at a single academic center in Toronto, Canada between 2008 and 2012 were included. Direct costs associated with each phase of a patient's clinical course were collected from the hospital's financial department and physician costs were calculated based on the provincial fee schedule. Costs of radiation treatments were derived from previously published literature from our center, which incorporates the costs of equipment, staff, and infrastructure. Ethical approval was obtained from the institutional research ethics board.

**Results:** A total of 111 patients were included, 75% of whom were male. The median patient age was 68 years (interquartile range [IQR] 61.5–76.5). Overall, 79 (71%) patients underwent RC and 32 (29%) were treated with TMT. Of patients in the TMT group, 41% had an American Society of Anesthesiologists (ASA) score greater than 2 compared to 77% in the RC group ( $p < 0.001$ ). Moreover, 50% of patients undergoing RC had a Charlson comorbidity Index  $\geq 7$  compared to 14% in the TMT group ( $p = 0.0015$ ). The RC group had higher rates of cT3/T4 compared to those in the TMT group (59% vs. 19%;  $p < 0.001$ ). The median cost in the treatment phase for RC was \$21 911 (IQR 19 384–28 531) vs. 15 407 (IQR 14 738–16 231) for TMT ( $p < 0.001$ ). There was no statistically significant difference between treatment groups with respect to cost of diagnosis and workup or neoadjuvant therapy. However, the median cost of followup care (clinic visits, imaging, and cystoscopy) was higher for patients undergoing TMT compared to RC (\$5519 vs. \$2876;  $p = 0.04$ ).

**Conclusions:** In appropriately selected patients with muscle-invasive bladder cancer where TMT is a reasonable treatment option, costs are not prohibitive and are somewhat lower than RC costs. With increasing followup time after primary treatment, the cost difference between modalities may be mitigated by the need for bladder surveillance and salvage therapy in the TMT cohort.

### MP3-08

#### Trends in early management of stage 1 non-seminoma germ cell testicular cancer

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SUNY Upstate Medical University

**Introduction:** Stage 1 non-seminoma germ cell testicular cancer (NSGCT) is currently managed with primary orchiectomy, followed by surveillance, retroperitoneal lymph node dissection (RPLND), and/or chemotherapy. Given the data on long-term side effects of chemotherapy, we hypothesized that more stage 1 NSGCT subjects are undergoing primary RPLND. The goal of this study was to assess trends in initial management for stage 1 NSGCT subjects.

**Methods:** The National Cancer Database (NCDB) was queried to identify subjects diagnosed with testicular cancer between 2004 and 2015. Inclusion criteria included pathologic stage 1 NSGCT disease. We excluded individuals with stage 1S, and unknown RPLND status, chemotherapy status, and pathologic staging data. We identified individuals who underwent chemotherapy at <60 days from diagnosis, RPLND in staging/diagnostic setting, and individuals without RPLND or chemotherapy <60 days (active surveillance). We used Chi-square and ANOVA to compare demographic (age, race, geography, insurance status, income) and clinical factors (histology, distance traveled for care) among subgroups. We generated trend charts to describe management patterns over time.

**Results:** Of the 8253 subjects in this study, 60% enrolled in active surveillance (AS), 22% received chemotherapy <60 days, and 18% underwent RPLND. An increase in the number of cases from 2004–2015 was noted. Treatment trends revealed a slight increase in AS and an increase in chemotherapy, with a decrease in RPLND. Individuals undergoing RPLND were more likely to travel further for care ( $p < 0.001$ ), receive care from >1 facility ( $p < 0.001$ ), and be treated at an academic/research program ( $p < 0.001$ ) vs. chemotherapy and AS. Individuals with embryonal histology and positive surgical margins were more likely to receive chemotherapy ( $p < 0.001$ ).

**Conclusions:** This study highlights a trend in increased primary chemotherapy for stage 1 NSGCT subjects with a decline in the rate of primary RPLND. Individuals undergoing RPLND were more likely to travel further for care and visit multiple facilities for care. Further studies should investigate factors influencing therapeutic pathways, as well as accessibility to care.

### MP3-09

#### Impact of a complex pelvic operative field on robot-assisted radical cystectomy morbidity

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Roswell Park Comprehensive Cancer Center

**Introduction:** The stigma of a previous surgery is hindering many patients to benefit from the advancement of technology associated with robot-assisted surgery. We, hereby, report the perioperative and oncologic outcomes of previous pelvic interventions in patients undergoing robot-assisted radical cystectomy (RARC).

**Methods:** We conducted a retrospective review of our prospectively maintained departmental database between 2005 and 2019; 586 RARC patients were identified. Patients were divided into three groups: having no previous abdominal surgery and/or upper abdominal surgery (320), having one pelvic surgery or radiation (186), and having two or more pelvic surgery and/or radiation (80). All groups were compared in terms of perioperative characteristics, pathologic and oncologic outcomes. Multivariate linear regression model was used to depict the predictors of blood loss and operative time. Multivariate logistic regression was used to depict the predictors of high-grade complications, and readmissions. The Kaplan-Meier method was used to depict recurrence-free (RFS), disease-specific (DSS), and overall survival (OS).

**Results:** Mean age was  $69 \pm 11$  years. Group 3 were more likely to have an American Society of Anesthesiologists (ASA) 3 (73% vs. 59% vs. 49%;  $p < 0.01$ ) and receive an intracorporeal urinary diversion (83% vs. 73% vs. 70%;  $p = 0.1$ ); however, they were less likely to receive a neobladder (3% vs. 7%, vs. 13%;  $p < 0.01$ ) compared to groups 2 and 1, respec-



tively. There was no statistical significant difference between the groups in terms of operative time ( $p=0.22$ ), transfusion rates ( $p=0.75$ ), length of ICU stay ( $p=0.93$ ), hospital stay ( $p=0.91$ ), complications (0.08), readmissions ( $p=0.41$ ), and perioperative mortality ( $p=0.31$ ). A statistically significant difference was found in mean estimated blood loss ( $p=0.04$ ), early complications ( $p<0.01$ ), and lymph node yield ( $p=0.02$ ) (Table 1). On multivariate linear and logistic regression models, previous pelvic surgery and/or radiation were not predictors for estimated blood loss, operative time, high-grade complications, and any readmissions. The three groups showed a similar RFS (log-rank  $p=0.33$ ), DSS (log-rank  $p=0.96$ ), and OS (log-rank  $p=0.57$ ).

**Conclusions:** RARC should be provided for all patients who are candidates for cystectomy despite their previous surgical history. RARC seems to have a comparable safety profile compared to open radical cystectomy. This paper has figures, which may be viewed online at: <https://www.eventscribe.com/2019/nsaua/SearchByBucket.asp?pf=Track>

### MP3-10

#### Perioperative and oncologic outcomes of robot-assisted radical cystectomy in octogenarians

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**Introduction:** Radical cystectomy is the gold standard for the treatment of organ-confined muscle-invasive bladder cancer and refractory non-muscle invasive disease. However, it remains a highly morbid procedure, especially for elderly patients. We sought to explore the safety, efficacy, and oncologic outcomes of robot-assisted radical cystectomy (RARC) in patients aged 80 years or more.

**Methods:** We retrospectively reviewed our quality assurance institutional database of RARCs. Patients were divided into two groups: those who were  $<80$  and those who were 80 years at the time of RARC. Both groups were compared in terms of perioperative characteristics, pathologic and oncologic outcomes. The Kaplan-Meier method was used to depict recurrence-free (RFS), disease-specific (DSS), and overall survival (OS). Multivariate linear and logistic regression models were used to depict the predictors of operative time, high-grade complications, and readmissions. A multivariate cox regression model was performed to identify variables associated with RFS, DSS, and OS.

**Results:** Eighty-one patients (16%) were 80 years. They more frequently exhibited American Society of Anesthesiologists (ASA) 3 (67% vs. 54%;  $p=0.03$ ), higher Charlson comorbidity index (CCI) (5.4 vs. 3.2;  $p<0.01$ ), received neoadjuvant chemotherapy (NAC) less frequently (14% vs. 29%;  $p=0.01$ ) and none received neobladders (0% vs. 12%;  $p=0.01$ ). They had similar pT3 disease (49% vs. 41%;  $p=0.15$ ), pN+ve (25% vs. 24%;  $p=0.90$ ), and positive surgical margins (7% vs. 8%;  $p=0.77$ ). They experienced comparable overall complications (77% vs. 70%;  $p=0.21$ ) and readmissions (22% vs. 26%;  $p=0.49$ ). Age was not significantly associated with longer operative time, complications, or readmissions. Older patients exhibited similar RFS (log-rank  $p=0.68$ ) and DSS (log-rank  $p=0.17$ ), but worse OS (log-rank  $p<0.01$ ) compared to younger patients (Fig. 1). Age was not associated with RFS, DSS; but was significantly associated with OS (Table 1).

**Conclusions:** RARC in octogenarians was not associated with higher perioperative morbidity or mortality. Octogenarians exhibited similar RFS and DSS but worse OS.

This paper has figures, which may be viewed online at: <https://www.eventscribe.com/2019/nsaua/SearchByBucket.asp?pf=Track>

### MP3-11

#### Is neoadjuvant chemotherapy associated with morbidity after robot-assisted radical cystectomy? results

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**Introduction:** We aimed to determine if neoadjuvant chemotherapy (NAC) utilization for non-metastatic muscle-invasive urothelial bladder cancer is associated with perioperative morbidity after robot-assisted radical cystectomy (RARC).

**Methods:** A retrospective review of the International Robotic Cystectomy Consortium (IRCC) database was performed between 2006 and 2017. After exclusion of patients with non-muscle-invasive bladder cancer, patients were divided into two groups: those who received NAC vs. those who did not. Data were reviewed for demographics, preoperative, operative, and 90-day perioperative outcomes. Cochran-Armitage trend test was used to assess trends of NAC use with high-grade and overall complications over time. Multivariate stepwise regression analyses were used to determine if NAC was associated with prolonged operative time, 90-day postoperative complications, readmissions, reoperations, and mortality after RARC.

**Results:** A total of 298 patients (26%) received NAC. Patients who received NAC were younger (67 vs. 69 years;  $p=0.01$ ), and more frequently had American Society Anesthesiologist score (ASA) 3 (62% vs. 55%;  $p=0.02$ ) and pathological T3 stage (28% vs. 22%;  $p=0.04$ ) (Table 1). Use of NAC increased significantly from 10% in 2006–2007 to 42% in 2016–2017 ( $p<0.01$ ) (Fig. 1). On multivariate analysis, NAC was not significantly associated with prolonged operative time, hospital stay, 90-day postoperative complications, reoperations, or mortality. NAC was associated with 90-day readmissions after RARC (odds ratio [OR] 5.90; 95% confidence interval [CI] 3.30–10.90;  $p<0.01$ ) (Table 2).

**Conclusions:** NAC use has significantly increased over the past decade. It was not associated with perioperative surgical morbidity after RARC.

This paper has figures, which may be viewed online at: <https://www.eventscribe.com/2019/nsaua/SearchByBucket.asp?pf=Track>

### MP3-12

#### Detailed analysis of urinary tract infections after robot-assisted radical cystectomy

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**Introduction:** Genitourinary infection complications contribute significantly to morbidity rate following robot-assisted radical cystectomy (RARC). In this study, we sought to investigate the timing, frequency, and associated factors with urinary tract infections after RARC.

**Methods:** We conducted a retrospective study from our prospectively maintained data for patients who underwent RARC between 2005 and 2019 at our institute. No prophylactic antibiotics were routinely administered. Patients were divided into two groups: patients who developed symptomatic urinary tract infection (UTI) with positive urine culture and patients who did not. Clinical and perioperative data were compared between the two groups. UTI timing, frequency, grade (1=pouchitis, 2=pyelonephritis, 3=urosepsis, and 4=septic shock), causative organism, and antibiotic sensitivity were analyzed. Multivariate cox regression was used to identify predictors of UTI.

**Results:** A total of 614 patients were analyzed; 242 patients (39%) developed UTI. The patients who developed UTI were younger, with median age of 69 years (60, 74) ( $p=0.02$ ), underwent neobladder intracorporeal

urinary diversion more frequently ( $p < 0.01$ ), had more high-grade complications ( $p < 0.01$ ), and were readmitted more frequently within 90 days of RARC ( $p < 0.01$ ) (Table 1). UTI occurred at a median of 33 days after RARC, with median (interquartile range [IQR]) of 2 (1, 3) episodes per patient. A quarter (25%) of UTI group patients had pouchitis, while 16% had pyelonephritis, 6% had urosepsis, and 6% admitted to ICU with septic shock. The most common causative organisms were *Escherichia coli*, *Enterococcus faecalis*, and *Klebsiella pneumoniae*. The highest antibiotic resistance were observed for gentamicin, cefepime, and trimethoprim. Multivariate analysis revealed that UTI was associated with intracorporeal neobladder urinary diversion (odds ratio [OR] 3.2; 95% confidence interval [CI] 1.5, 6.7;  $p < 0.01$ ), T3 or T4 pathological tumor stages (OR 1.8; 95% CI 1.2, 2.9;  $p < 0.01$ ), prolonged hospital stay (estimate 0.1 and  $p < 0.01$ ), and presence of hydronephrosis (OR 3.8; 95% CI 1.9, 7.6;  $p < 0.01$ ) (Table 2).

**Conclusions:** The rate of UTI after RARC is very high. Knowing the organisms, time to infection and antibiotics sensitivities could trigger antibiotic prophylactic utilization to reduce the morbidity after RARC.

This paper has figures, which may be viewed online at: <https://www.eventscribe.com/2019/nsaua/SearchByBucket.asp?pf=Track>

### MP3-13

#### The impact of weekly multidisciplinary meeting on the early perioperative outcomes after robot-assisted radical cystectomy: A matched analysis

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**Introduction:** Establishment of an enhanced recovery after surgery (ERAS) pathway was associated with improved outcomes after radical cystectomy. We developed the NEEW cystectomy pathway (Nutrition, Exercise, Patient Education, and Wellness), which encompasses a multidisciplinary team to coordinate and actively engage with patients in the perioperative period. We sought to investigate the effect of incorporation of this weekly meeting on perioperative outcomes after robot-assisted radical cystectomy (RARC).

**Methods:** We retrospectively reviewed our prospectively maintained cystectomy database. Patients were divided into two groups: those who were enrolled in the NEEW cystectomy pathway and those who did not. Propensity score-matching was performed for both groups (1:2 ratios) in terms of patient and disease characteristics. Perioperative outcomes (estimated blood loss, operative time, the return of bowel function, functional mobility time, pain score, length of intensive care unit [ICU] and hospital stay, and 30-day complications and readmissions) were compared. Multivariate analyses were modeled to assess for any association between NEEW pathway and perioperative outcomes.

**Results:** A total of 192 patients who underwent RARC for bladder cancer were included in the study: 64 patients (33%) in the NEEW pathway group vs. 128 patients (67%) in the non-pathway group. The pathway group patients had shorter mean ICU stay (17 vs. 34 hours;  $p = 0.02$ ), shorter length of hospital stay (5.5 vs. 7.3 days;  $p < 0.01$ ), faster return of bowel function (3 vs. 4 days;  $p < 0.01$ ), and significantly less pain score on days 1, 2, and 3 after RARC (3 vs. 4, 2 vs. 3, and 1 vs. 3;  $p < 0.01$ ), respectively. The maximum functional mobility time was longer in pathway group patients (23 vs. 19 minutes;  $p = 0.01$ ). Thirty-day high-grade complications were significantly less in the pathway group (5% vs. 16%;  $p = 0.02$ ), however, readmission rates were similar ( $p = 0.11$ ) (Table 1). The NEEW pathway was associated with less ICU and hospital stay, faster return of bowel function, more functional mobility time and lower pain score three days after RARC on multivariate analysis (Table 2).

**Conclusions:** NEEW pathway was associated with improved short-term perioperative outcomes after RARC.

This paper has figures, which may be viewed online at: <https://www.eventscribe.com/2019/nsaua/SearchByBucket.asp?pf=Track>

### MP3-14

#### Gemcitabine implementation project: Improving rates of immediate postoperative intravesical chemotherapy instillation for low-grade non-muscle-invasive urothelial cancer

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**Introduction:** The rapidly developing field of implementation science is dedicated to translating scientific discoveries into real-world clinical practice. Despite advances in urologic oncology research, there is often a disconnect between these advancements and real-world practice, which leaves our patients receiving suboptimal care. AUA guidelines recommend consideration of an immediate postoperative instillation of intravesical chemotherapy (IVC) for low- and intermediate-risk urothelial cancers, which has been shown to reduce tumor recurrence up to ~40%. However, rates of immediate postoperative IVC use remains low due to high drug costs, low availability, and substantial side effects. Mitomycin C is the standard of care for immediate postoperative IVC, but recent data has demonstrated that gemcitabine (Gem) has similar efficacy in reducing tumor recurrences, while being more tolerable and less expensive. The purpose of this study was to create an implementation protocol at our institution to improve usage rates of immediate postoperative Gem. Because histology is not available to the surgeon prior to ordering IVC, the accuracy of visual grading during cystoscopy was determined for our group of surgeons.

**Methods:** Pre-intervention audits were performed at two of our institution's hospitals (Hospital A and Hospital B) to determine for baseline rates of appropriate use of immediate postoperative IVC in patients with low-grade (LG) non-muscle-invasive (NMI) urothelial carcinoma (UC) undergoing transurethral resection of bladder tumors (TURBT) over a three-month period. Needs assessment was performed to recognize key stakeholders and identify barriers to use within our institution. An intervention protocol was designed and implemented, which included construction of new electronic medical record (EMR) order sets, education of providers and staff, and establishment of communication checkpoints. A four-month post-intervention audit was performed.

**Results:** Prior to knowing histology, our urologists can accurately predict LG histology with a positive predictive value (PPV) of 80%. Pre-intervention rates of appropriate IVC use were 9% at hospital A and 39% at hospital B. Post-intervention rates were 81% at hospital A and 84% at hospital B.

**Conclusions:** Prior to knowing histology, our urologists can accurately predict LG histology and, thus, patients who will require IVC after TURBT. There was a significant improvement in the rates of immediate postoperative Gem at both hospitals included in this intervention. Continued refinement of the protocol will be necessary to further improve and sustain these improved rates. This success indicates that our intervention may be used as a model for other institutions.

### MP3-15

#### Linking bladder cancer incidence and chemical contamination using geographic information analysis

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**Introduction:** Western New York (WNY) has a high concentration of industrial sites; therefore, it becomes an ideal study area to evaluate the possible environmental links between contamination and occurrence of bladder cancer. The work presented here focuses on two counties composing the catchment area for Roswell Park in WNY, where there are an average of 355 and 96 new cases, respectively, of bladder cancer per year. Geographic information analysis (GIA) provides a way to decipher environmental impact and contributions to the development of bladder cancer.

**Methods:** Using survey information of patient life histories, along with classifications from the NY Department of Environmental Conservation (NYS-DEC) and the US Environmental Protection Agency (EPA), contaminated sites were examined to identify geospatial correlations with bladder cancer incidence. We used optimized GETIS-ORD cluster analyses with ArcMap® to identify regions of interest (ROIs) where geographic

correlation exists between given variables, with validation through Morans I calculations.

**Results:** The dataset included 237 selected patients who resided in WNY. Optimized cluster analysis illustrated ROIs where the three variables are strongly positively or negatively spatially correlated in the 95–99% confidence interval. Concepts of GIA and environmental chemistry identified ROIs where the densities of known contaminated sites, patient location, and water classification data are significantly positively correlated to bladder cancer (Fig. 1).

**Conclusions:** Using cluster analysis and principles of GIA, we identified spatial correlations that indicated an environmental impact and water quality contributed to increased bladder cancer patient density. This work may pave the road for developing screening programs.

*This paper has figures, which may be viewed online at: <https://www.eventscribe.com/2019/nsaua/SearchByBucket.asp?pfp=Track>*

### MP3-16

#### Disparities in treatment burden between black and white men with stage I seminoma

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**Introduction:** Previous literature has described racial disparities among several urologic malignancies, including testicular cancer. Stage I seminoma of the testis is associated with an overall good prognosis and, therefore, there is growing emphasis on reducing treatment burden. The purpose of this study is to investigate whether a difference in treatment burden exists between black and white men with stage I seminoma.

**Methods:** The National Cancer Database (NCDB) was queried to identify black and white men with stage I seminoma of the testis diagnosed between 2004 and 2015. Baseline demographic characteristics included age at diagnosis, Charlson comorbidity index (CCI), insurance status, median household income by residence, education level, distance to facility, and treatment facility type. Patients were stratified based on the total number of treatment modalities they received following orchiectomy, including: active surveillance (AS), radiation therapy (RT), chemotherapy (CT), or retroperitoneal lymph node dissection (RPLND) alone or in combination. Chi-squared testing was used to determine differences in treatment burden frequencies between race.

**Results:** A total of 25 422 men were included in our analysis, of which 24 601 (97%) were white and 821 (3%) were black. When compared to white men, black men were younger at diagnosis, had a higher CCI (8% vs. 6%;  $p=0.042$ ), were more likely to be uninsured or have government insurance (17% vs. 9% and 23% vs. 13%, respectively;  $p<0.001$ ), and more frequently received treatment at an academic center (54% vs. 39%;  $p<0.001$ ). Black men were more likely to be followed on active surveillance compared to white men (51% vs. 46.3;  $p<0.001$ ). When comparing black and white men who received additional treatment following orchiectomy, black men were twice as likely to receive two treatment modalities (2.1% vs. 1%;  $p<0.001$ ) and twice as likely to undergo RPLND after chemotherapy (2.6 % vs. 1.2%;  $p<0.001$ ).

**Conclusions:** Using the largest testis cancer database available, black men were found to have a higher treatment burden than white men for stage I seminoma. Moreover, black men were twice as likely to undergo post-chemotherapy RPLND.

### MP3-17

#### Is renal volume and function compromised in oncocytoma patients on active surveillance?

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**Introduction:** The oncologic safety of active surveillance (AS) in renal oncocytoma has been widely reported. However, a remaining concern of uncovering all oncocytoma patients is the hypothetical possibility of renal functional deterioration due to mechanical effects of an enlarging tumor on normal renal parenchyma. Here, we tested this hypothesis by evaluating renal functional outcomes of oncocytoma tumors on AS, including three-dimension (3D) imaging software to measure ipsilateral renal

parenchymal volumetric changes in patients with large and/or actively growing oncocytoma tumors.

**Methods:** A renal tumor AS database at Roswell Park Comprehensive Cancer Center was queried to identify all renal oncocytoma patients with at least 18 months' followup on AS. Renal functional outcomes (creatinine [Cr], glomerular filtration rate [GFR]) were retrospectively reviewed to determine changes during AS. Tumor volume was calculated using the formula  $0.5362 \times x \times y \times z$  when three dimensions were available and  $0.5362 \times x \times y \times (x+y)/2$  when two dimensions were available. Oncocytoma patients with an estimated volume increase on AS of at least 20 cm<sup>3</sup> were selected for automated 3D volumetric assessment of the tumor and ipsilateral renal parenchyma using computed tomography (CT) images with Myrian® software. Ipsilateral renal parenchymal volume and tumor volume were compared between first and last available CT images.

**Results:** Among a total of 32 oncocytoma patients on AS, 22 with at least 18 months' followup were identified (median 33, mean 37.5, range 19–95 months). Median (mean) estimated tumor volume for these 22 patients was 8.5 cm<sup>3</sup> (27.3 cm<sup>3</sup>) at AS initiation compared to 16.8 cm<sup>3</sup> (42.73 cm<sup>3</sup>) at last followup. Median (mean) Cr and GFR for these 22 patients was 1.02 mg/dl and 70.9 ml/min/1.73 m<sup>2</sup> (1.0 and 68.6) at AS initiation compared to 0.89 mg/dl and 79.5 ml/min/1.73 m<sup>2</sup> (0.9 and 74.2) at last followup. A total of nine patients were identified with estimated volume increase of at least 20 cc on AS, most of whom had tumor size >5 cm at last followup. Tumor volumes calculated for these nine patients using 3D imaging software (range 11.3–222) correlated well with estimated tumor volumes (range 9.2–232). The median change in 3D tumor volume on AS was 26.1 cm<sup>3</sup> (mean 40.5, range 20.2–106), while the median change in normal renal parenchymal volume was -8.0 cm<sup>3</sup> (mean -6.1, range -35–23). Six of nine (67%) tumors had minimal to no decrease (10 cm<sup>3</sup> or more) in 3D renal parenchymal volume on AS.

**Conclusions:** Loss of renal parenchyma and function may be uncommon in oncocytoma patients regardless of tumor growth and size. This result supports the renal functional safety of AS for oncocytoma, however, larger studies with longer followup and larger tumor volume increases are needed.

### MP3-18

#### Economic analysis of three different 3D models for preoperative surgical planning of renal masses

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**Introduction:** For renal mass surgical management, preoperative evaluation and the decision to pursue radical (RNx) or partial (PNx) nephrectomy is vital. This decision is based largely on imaging (computed tomography [CT]/magnetic resonance imaging [MRI]) and can be aided by additional modeling modalities. This study aims to describe the preoperative decision-making behaviors of novice (<50 cases) and expert (>250 cases) surgeons when presented with different preoperative decision-making aids.

**Methods:** The subjects consisted of seven novices and six expert surgeons evaluating 15 renal mass cases. Imaging (CT and/or MRI) for each case was collected retrospectively. Each case was assigned a nephrometry score (NS) by an expert radiologist and grouped according to complexity: low (46), moderate (79), or high (1012). Three patient-specific models were created; a virtual 3D model, a hard 3D printed model, and a dissectible soft hydrogel model. All subjects were blinded to patient characteristics. Subjects were asked to provide a preoperative decision using imaging alone, and then again with the aid of a randomly determined model modality. Each surgeon reviewed an equal number of complex cases (according to NS score) with each modality.

**Results:** Using imaging alone, novices are significantly less likely than experts to choose RNx for tumors with high complexity (NS >10) ( $p<0.0001$ ). Novices were statistically as likely as experts to pursue RNx in low-complexity cases (NS<7) ( $p=0.2778$ ). With the aid of both the 3D hard or 3D soft models, novice responses to high-complexity cases were no longer statistically different from expert responses (without the use of model) ( $p=0.8029$  and  $p=0.6126$ , respectively). However, the difference



in response to high-complexity persisted between novices and experts when subjects were supplied with the CAD model ( $p \leq 0.0001$ ).

**Conclusions:** This study is the first to use choice model economic analysis for preoperative evaluation of RNx vs. PNx. Novice deficits in preoperative planning are amplified by complex renal masses. This study suggests physical 3D models compared to virtual models improve novice performance to expert level preoperative evaluation and suggests a new modality for training novices in preoperative decision-making.

*This paper has figures, which may be viewed online at: <https://www.eventscribe.com/2019/nsau/SearchByBucket.asp?pfp=Track>*

### MP3-19

#### Visual metrics identify change of mental health status in patients after major oncologic surgery

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Roswell Park Comprehensive Cancer Center

**Introduction:** We aimed to find the relationship between visual metrics and mental health measurements of pain, hope, anxiety, and mental well-being.

**Methods:** Sixteen patients, in recovery phase after major oncologic surgeries, wear Tobii eye glasses and were exposed to three categories of art paintings (abstract, figurative, and landscape; total 18 works of art) at the Roswell Park Art Gallery, developed in collaboration with the Albright Knox Art Gallery, for 15 minutes. Patients completed a survey assessing baseline art knowledge and four post-study questionnaires assessing pain (Pain Rating Scale), hope (Herth Hope Index [HHI]), anxiety (State-Trait

Anxiety Inventory for Adults [STAI]), and mental wellbeing (Warwick-Edinburgh Mental Wellbeing Scale). Extracted eye gaze metrics: 1) trajectory volume: volume encompassed by trajectory of pupil movement; 2) fixation: a period in which patients eyes is locked toward a specific area of art piece; and 3) saccade: the eye gaze points between fixations are known as saccades.

**Results:** Eye fixation has been suggested as a measure of cognitive engagement. Negative association between pain severity level and fixation rate may suggest that tolerating pain decreases cognitive engagement to the task, while increase of HHI is associated with higher fixation rate, indicating higher engagement to task in patients with higher level of hope. Saccade feature has been proposed to measure a subject's attention shift with different events and awareness. Negative correlation between saccade and STAI shows the loss of awareness by anxiety increase, while cognitive well-being increases awareness. Pupil diameter has been frequently proposed as an indicator of cognitive mental workload, as pupil dilates under mental workload. Our results also showed that higher well-being, and HHI is associated with lower pupil diameter of both left and right eyes, showing lower mental resources are loaded (mental workload) to process the same task in patients with higher well-being and hope level. However, anxiety level (STAI) increases mental workload needed to process task.

**Conclusions:** Mental health status may be evaluated by visual metrics.

*This paper has figures, which may be viewed online at: <https://www.eventscribe.com/2019/nsau/SearchByBucket.asp?pfp=Track>*

## Moderated Poster Session 4: Female Urology/Incontinence and Infertility/Impotence/General Urology

### MP4-01

#### Management of neurogenic lower urinary tract dysfunction and impact on disability in spinal cord injury patients in Canada

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**Introduction:** Management of neurogenic lower urinary tract dysfunction (NLUTD) following spinal cord injury (SCI) is a crucial component of a rehabilitation program with an immediate impact on quality of life. Therefore, we aimed to identify the impact of NLUTD and related management strategy on disability and quality of life in a SCI population from a Canadian societal perspective.

**Methods:** This is a retrospective, multicenter study analyzing a database of 198 adult patients with traumatic SCI who received urologic care at Rick Hansen Institute participating facilities in Montreal, Canada from 2010–2017. Participants underwent clinical evaluation, including demographic and injury profile based on the American Spinal Injury Association Impairment Scale (ASIA). Patients provided urine analysis and completed validated questionnaires of General Self-Efficacy Scale (GSE), and pain inventory. Functional state of patients was evaluated using the Spinal Cord Independence Measure (SCIM). Patients also described their bladder management method over the long term.

**Results:** A total of 155 men and 43 women with a mean age of  $53 \pm 18.5$  years were included in the study. The etiology of lesion was traumatic falls in 98 (50%) patients and transport-related injury in 43 (22%) patients. The mean period following injury at assessment was  $3 \pm 8.3$  years. Most of these SCIs were incomplete motor by the ASIA classification. Bladder management at followup was normal voiding in 73 (49%), intermittent self-catheterization (ISC) in 52 (35%), catheterization by attendant in four (3%), and indwelling catheterization in 19 (13%). Patients with urinary tract infection (UTI) had significantly less total SCIM score and subscales scores. ISC and normal voiding groups had significant higher SCIM and GSE scores compared to other groups (Table 1).

**Conclusions:** The most common bladder management methods were normal voiding and ISC. Bladder management strategy and UTI had substantial impact on long-term ability of SCI patients to perform basic activities independently. The use of ISC can provide optimal management and is associated with better long-term quality of life and lower disability in selected SCI patients.

This paper has figures, which may be viewed online at: <https://www.eventscribe.com/2019/nsaua/SearchByBucket.asp?pfp=Track>

### MP4-02

#### An alternative injection paradigm for the treatment of overactive bladder with onabotulinumtoxinA is associated with a low incidence of clean intermittent catheterization in female patients

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**Introduction:** Results from three phase 3 and one phase 4 trial demonstrated that onabotulinumtoxinA (onabotA) 100 U administered as 20 evenly spaced intradetrusor injections avoiding the trigone significantly reduced urinary incontinence (UI) and improved quality of life in patients with overactive bladder (OAB). The clean intermittent catheterization

(CIC) rate in the pooled female population was 5.2%. This study tested the hypothesis that targeting more afferent nerves via trigonal/peri-trigonal injections could be effective and have a lower CIC incidence vs. the standard injection paradigm.

**Methods:** This multicenter, randomized, double-blind trial (NCT03052764) included adults with OAB and UI inadequately managed with an anticholinergic. Eligibility criteria were identical to prior studies. Patients were randomized 2:1 to onabotA 100U or placebo, administered as two trigonal and eight peri-trigonal injections.

**Results:** Of 115 randomized females (96% of population), 112 were included in this efficacy analysis. There was no CIC use in the first 12 weeks in females in either the onabotA or placebo group. Baseline UI (episodes/day) was 6.02 for onabotA (n=73) and 6.34 for placebo (n=39). A significantly higher least squares mean reduction from baseline in UI was observed with onabotA vs. placebo at week 12 ( $-3.07$  vs.  $-0.15$  episodes/day;  $p < 0.0001$ ). The proportions of patients with 100% reduction in UI episodes/day at week 12 were 14.3% and 2.7%, respectively. Adverse events were predominantly mild/moderate; urinary tract infection was most common (onabotA 37.0%; placebo 25.6%).

**Conclusions:** Although not a direct comparison, post-treatment CIC use in females who received onabotA 100 U with the new trigonal/peri-trigonal injection paradigm was lower than that reported in phase 3 or 4 studies, which used the traditional paradigm (0 vs. 5.2%), possibly because in the new paradigm, treatment was more targeted to afferent nerves. The efficacy of the new onabotA injection paradigm is similar to that seen in previous trials.

### MP4-03

#### Does surgical removal of pelvic mesh improve patient outcomes? A prospective longitudinal study of patients with mesh complications

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**Introduction:** We aimed to define symptom resolution following removal of urogynecologic mesh in women with complications.

**Methods:** In a single-center, prospective, longitudinal study of women undergoing mesh removal from 2012–2019, data was collected at baseline and up to two years after mesh removal, including the patient global impression of severity and improvement (PGI-S, PGI-I), pelvic floor distress inventory (PFDI-20), and visual analog scales (VAS) assessing pelvic pain, dysuria, dyspareunia, and dyschezia. Patients were grouped by the primary reason for removal (exposure, pain, pain with exposure [pain + exp]), with PGI-S as the primary outcome. Baseline and 6–24 months post-removal outcomes were compared using appropriate statistical tests, with the last value carried forward. Postoperative VAS and PFDI-20 scores improved if a minimally clinically important difference (MCID) of 13 mm (VAS) and 45 (PFDI-20) was achieved.

**Results:** Of 170 women enrolled, 28 underwent removal for exposure, 46 for pain, and 96 for pain + exp. While exposures were older ( $p < 0.001$ ), there were no differences in body mass index, parity, mode of delivery, menopausal status, or hormone therapy use. Twenty-eight percent of patients were using at least one opioid medication (18% exposure, 41% pain, and 26% pain + exp;  $p = 0.07$ ) at baseline. Median interval between mesh placement and symptom onset was 12, six, and three months for exposure, pain and pain + exp, respectively. However, time to surgical removal was much longer at 7.2, 6.7, and 6.1 years, respectively. Most patients with pain had a mid-urethral sling removed (76% pain and 62%

pain + exp;  $p=0.04$ ). While there was no difference in PGI-S in the three groups at baseline, after mesh removal, more patients with exposure reported normal and mild symptom severity as compared to pain or pain + exp ( $p=0.03$ ). On PGI-I, 68% of patients with exposure reported symptoms as very much better and much better after removal compared to pain (33%) and pain + exp exposure (55%;  $p=0.07$ ). Patients reporting pain with or without exposure had higher PFDI-20 symptom bother at baseline vs. exposure alone ( $p=0.03$ ) and at 6–24 months postoperative ( $p=0.003$ ), with only 41–45% achieving a MCID bother symptoms. VAS for pelvic pain, dysuria, dyspareunia, and dyschezia scores were worse in patients with pain pre- and post-removal ( $p<0.001$ ), with the exception of dysuria postoperatively in which there was no difference between groups.

**Conclusions:** Women with mesh complications report poor symptom resolution after mesh removal. Those with pain complications report less improvement and worse symptoms than those with exposure. Future research is aimed at defining risk factors for poor symptom resolution.

### MP4-04

#### Demographics among members of the Society of Urodynamics, Female Pelvic Medicine and Urogenital Reconstruction (SUFU)

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**Introduction:** The Society of Urodynamics, Female Pelvic Medicine and Urogenital Reconstruction (SUFU) is an organization of healthcare providers whose goal is to improve research within the field of neurourology, voiding dysfunction, and female pelvic medicine. SUFU recently gained ACGME accreditation in 2013. Both urology and gynecology residents are eligible to apply to most FPMRS programs. Our study objective was to evaluate the current demographics among SUFU members.

**Methods:** We used the “find a provider” tool located on the SUFU website to identify physicians who are members of SUFU, and their location within the U.S. We included those people who had their MD or DO, whose main specialty was urology or obstetrics and gynecology (ObGyn), and were currently living. For fellowship information, we were solely interested if members had completed a female pelvic medicine and reconstructive surgery fellowship or a neurology/voiding dysfunction fellowship. Other types of fellowships were not included in our data. Participation in a fellowship program was determined by using the past fellows page on the SUFU website and searching for the physicians’ name. If their name was not present on the website, a Google search was done; if a fellowship did not result within the top four Google searches, it was assumed that the physician was not fellowship-trained.

**Results:** A total of 365 physicians met our inclusion criteria: 246 males and 120 females. Three hundred thirty-two of the SUFU members were urologists and 33 were ObGyns. We found that there were more SUFU members located along the East Coast when compared to the West Coast. Most (253, 69%) of the physicians completed fellowship; 112 (31%) of them had no fellowship training. The percentage that completed a neurourology or voiding dysfunction fellowship was <1%. The length of fellowship programs varied, with 126 (50%) completing one year of training, 69 (27%) completing two years, and 25 (10%) completing three years of training. We found that 80% of physicians that completed a three-year program were ObGyns.

**Conclusions:** The majority of SUFU members are male (67%) and urologists (91%). Most (69%) SUFU members have completed fellowship training, with half them completing one year of training. Even though our data currently shows that the majority of SUFU members are male, recent studies have revealed a rising number of females going into the field and we believe this trend will change over time.

### MP4-05

#### 400 ng/dL appears to be the best definition for hypogonadism in men with unexplained infertility

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**Introduction:** Idiopathic male infertility can be a vexing problem, often negatively impacted by the effect hypogonadism has on semen parameters. Convention has held that lower total testosterone (TT) values correlate with worse semen parameters. A variety of reference values to define hypogonadism are currently being used, and include 264, 300, and 400 ng/dL. This study sought to determine where on the TT continuum, semen analysis parameters were optimized. This value would suggest a TT cut point below which medical intervention should be suggested.

**Methods:** We performed an IRB-approved retrospective chart review of 302 consecutive males presenting to a community infertility clinic for evaluation of unexplained male factor infertility over a 24-month period. After exclusions, a continuous plot analysis was performed on 145 men using three discrete TT bins (<264, 265–400, and >400 ng/dL). The plot best fit polynomial curve (power 2 or 3) was able to provide the TT point associated with the maximum semen analysis (SA) parameter.

**Results:** Maximal semen analysis values were reached at the following TT (ng/dL) cut point. Volume = 386; concentration = 483 ( $X^3$  polynomial fit), 298 ( $X^2$  polynomial fit); motility = curve was U-shaped (with minima) instead of maxima. Minima was at 395. Morphology = 325. Except for motility, beyond the maxima TT value listed above, each curve declined (due to a lack of data beyond the maximal value).

**Conclusions:** When defining hypogonadism in males with unexplained infertility, a TT cut point of 400 ng/dL appears to be optimal. SA values (except motility) continue to improve beyond the other two cut points of 264 and 300 ng/dL. Future studies should include SA values associated with TT values above 400, as the real cut point may be higher than 400 ng/dL.

This paper has figures, which may be viewed online at: <https://www.eventscribe.com/2019/nsaua/SearchByBucket.asp?pfp=Track>

### MP4-06

#### At every total testosterone cut point used to define hypogonadism, clomiphene citrate significantly improved both total testosterone and sperm concentration.

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**Introduction:** The use of clomiphene citrate (CC) has been shown to positively influence sperm concentration for those with both unexplained infertility and hypogonadism. Unfortunately, a cut point for defining hypogonadism has not been established, with literature supporting total testosterone (TT) cut points of 264, 300, and 400 ng/dL. Our hypothesis was that men with the lowest TT (<264) would have the greatest improvement in both post-CC semen analysis (SA) and TT.

**Methods:** We conducted an IRB-approved chart review of 302 consecutive male patients presenting with unexplained infertility. All hypogonadal clients received >90 days of 50 mg daily CC. We excluded patients with: 1) baseline TT >400 ng/dL; 2) lacking post-CC labs; or 3) receiving letrozole. Twenty-four patients were evaluated using paired T-test and Spearman rank order correlations to evaluate the differences in pre- and post-CC treatment SA and TT.

**Results:** CC treatment, at all cut points, resulted in significant improvement in both TT and sperm concentration. Mean (standard deviation [SD]) TT pre-CC = 245 (99.7); post-cc = 613 (272 ng/dL) ( $p<0.0001$ ). Mean (SD) sperm concentration pre-CC = 15 (27.8); post-CC = 28 (32.9 million/cc) ( $p=0.003$ ). There was no difference in post-CC sperm motility ( $p=0.489$ ) or morphology ( $p=0.963$ ).

**Conclusions:** For men with both unexplained infertility and hypogonadism, CC improved TT and sperm concentration at all three TT cut points. Below 400 ng/dL, CC treatment (for all TT cut points) should be considered. Future studies should include a larger cohort, a higher TT cut point, and include post-CC pregnancy and live birth rates.

This paper has figures, which may be viewed online at: <https://www.eventscribe.com/2019/nsaua/SearchByBucket.asp?pfp=Track>



# MP4-07

## Three different total testosterone cut points to define hypogonadism do not predict poorer semen parameters

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**Introduction:** Idiopathic male infertility can be a vexing problem for health-care providers; 8–12% of couples worldwide will experience infertility, with 40–50% of this infertility due to male factors. It is well-understood that hypogonadism negatively impacts male fertility. However, establishing which total testosterone (TT) level best defines hypogonadism and, thereby, negatively affects semen parameters has been challenging. Convention has held that lower TT values correlate with worse semen parameters. A variety of reference values to define hypogonadism are currently being used, and include 264 ng/dL, 300 ng/dL, and 400 ng/dL. This study sought to determine if semen analysis parameters (volume, sperm concentration, motility, and morphology) worsened as the TT reference value was lowered.

**Methods:** We performed an IRB-approved retrospective chart review of 302 consecutive males presenting to a community infertility clinic for evaluation of male factor infertility over a 24-month period. After exclusions, one-way ANOVA and Levene comparative analyses of volume and sperm parameters were performed on 145 men: specific to volume analysis, 57 were hypogonadal according to a TT cutoff of <264 (group 1); 13 with cutoff of 264–300 (group 2); 39 with a cutoff of 301–400 (group 3); and 36 with a TT over 401 ng/dL (group 4).

**Results:** The results of this study demonstrated no significant difference in study parameters (Table 1) between the three different cutoff values for defining hypogonadism.

**Conclusions:** There is no significant difference in semen parameters when using different cutoffs for total testosterone to define hypogonadism in men with idiopathic male infertility. The major new finding of this study supports the idea that male factor infertility is multifactorial, and that practitioners cannot reliably use hypogonadism (according to any current reference level) as an accurate measure of male factor infertility.

*This paper has figures, which may be viewed online at: <https://www.eventscribe.com/2019/nsaua/SearchByBucket.asp?pfp=Track>*

# MP4-08

## The relationship between overactive bladder and obstructive sleep apnea in a Canadian community-based population

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**Introduction:** Obstructive sleep apnea syndrome (OSAS) is associated with hypoxia, cardiovascular complications, and metabolic syndrome, all of which have been linked to overactive bladder syndrome (OAB) and erectile dysfunction. Considering a possible common pathophysiology between OSAS and OAB, we aimed to identify the prevalence of OAB symptoms among patients with OSAS, and to describe the relationship between OSAS, OAB, and erectile dysfunction in a community-based population of Canadian men.

**Methods:** This is a cross-sectional study of 988 male participants of the Mens Health Day organized by McGill University (Montreal, Canada) during three consecutive years (2013–2015). Participants underwent clinical evaluation, provided urine analysis and blood sampling (testosterone levels), and completed validated questionnaires of sexual health inventory (SHIM and ADAM) and lower urinary tract symptoms (OAB-V8 and IPSS). Berlin questionnaire was also completed to classify participants into high and low risk of OSAS. Patients with persistent and frequent symptoms in any two of three domains were considered to be at high risk for sleep apnea. Patients with total OAB-V8 score 8 were considered to have OAB.

**Results:** A total of 988 men with a mean age of 55±12.8 years were included in the study. The prevalence was 22.8% for OSAS, 36% for OAB, 50% for erectile dysfunction (mild to severe), and 60% for androgen deficiency. The high-risk OSAS group demonstrated significantly higher body mass index, blood pressure, triglycerides, and OAB-V8 score, while their testosterone level was significantly lower than the low-risk group. The incidence of diabetes mellitus, hypogonadism (ADAM), and severe

lower urinary tract symptoms (IPSS) were also higher among the high-risk group. The OAB-V8 score positively correlated with age ( $r=0.234$ ), IPSS score ( $r=0.721$ ), and Berlin score ( $r=0.111$ ). SHIM score inversely correlated with OAB score ( $r=-0.263$ ), IPSS ( $r=-0.259$ ), and age ( $r=-0.418$ ).

**Conclusions:** Higher risk of OSAS appears to be associated with metabolic syndrome, OAB, and lower testosterone level. Severity of erectile dysfunction correlated with severity of symptoms of OAB syndrome, but showed no association with OSAS.

*This paper has figures, which may be viewed online at: <https://www.eventscribe.com/2019/nsaua/SearchByBucket.asp?pfp=Track>*

# MP4-09

## A thematic analysis of the online discussion board, FrankTalk, regarding penile implant

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**Introduction:** Online medical websites and discussion are commonly used by patients to obtain information. The online forum *FrankTalk.org* provides a venue for men to specifically discuss sexual function problems. By querying and better understanding the content of this forum, we can define topics that patients are discussing online and better focus on these issues in office visits.

**Methods:** Messages posted in a six-month window from January 2018 to June 2018 under the topic “Implant” were identified on *FrankTalk.org*. These posts were then organized using a three-stage analysis to determine central themes of each message: open coding, axial coding, selective coding.

**Results:** There were 587 posts identified, posted by 199 unique usernames. Of the people posting on this subject, 97 were preoperative or considering an implant and 102 were postoperative. Ages ranged from 20–85, with a mean age of 50.5 years. Of all 587 posts, 304 were considered preoperative, with the most common theme being seeking support (18.4%), which primarily focused on patients sharing their story, asking for advice, and connecting with peers. Other common themes, in order of frequency included how to prepare for surgery (14.8%), referrals for surgeons (14.1%), and size of penis postoperatively (13.8%). Two hundred eighty-three posts were considered postoperative, of which the most common theme was concern about healing (23.7%), which questioned if their healing was normal and if they needed to see a physician. Other common postoperative themes, in order of frequency, included difficulty pumping the implant (20.5%), size of penis postoperatively (18.7%), and posts expressing postoperative satisfaction (13.1%).

**Conclusions:** Patients appear to use online discussion boards like *FrankTalk.org* for social support and validation of their concerns. Providers should be aware of these online topic focuses to help open a discussion with patients about concerns they may feel are difficult to approach with providers.

# MP4-10

## Association between pharmacologic treatment of osteoporosis and kidney stones in National Health and Nutrition Examination Survey respondents

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**Introduction:** Kidney stones and osteoporosis are two very common diseases in the U.S. The pathophysiology of these diseases overlap in a number of metabolic processes. Recent studies have shown an association between the diagnosis of osteoporosis and prior urinary calculus. Our aim was to use the National Health and Nutrition Examination Survey (NHANES) database to investigate whether the treatment of osteoporosis with pharmacologic interventions changes the occurrence or frequency of stone disease in this subpopulation.

**Methods:** This is a cross-sectional study that analyzed data from the NHANES surveys in 2007–2008, 2009–2010, and 2013–2014. We collected information from the surveys regarding age, gender, race, level of education, body mass index (BMI), prescription medications, history of kidney stones, and number of kidney stones passed on all patients who

reported having osteoporosis in these years. This data was then stratified and analyzed.

**Results:** Data on 1060 patients was collected, of which 321 received pharmacologic intervention for osteoporosis and 739 did not; 14.2% of these patients reported a history of kidney stones. The majority of patients in the study were female (86.7%) and older than 50 (92.0%). Pharmacologic treatment for osteoporosis was associated with a 4.2% decrease in kidney stone history (15.4% of untreated and 11.2% of treated patients), which approached but did not reach statistical significance (odds ratio [OR] 0.693; confidence interval [CI] 0.464–1.033). When stratified for age, this effect became significant in patients over the age of 50 (OR 0.629; CI 0.408–0.969). There was no significant difference when stratifying for gender, BMI, educational status, thiazide use, calcium supplementation, or vitamin D supplementation. Treatment did not have an effect on the number of kidney stones a patient passed.

**Conclusions:** Our results show that pharmacologic treatment of osteoporosis may be associated with a lower risk of kidney stone formation, specifically in the population over the age of 50. This new information may help guide clinical treatment and screening decisions for both osteoporosis and stone patients in the future. Future research on this issue should be done to further clarify the relationship between osteoporosis treatments and their effect on kidney stone formation. Data from more patients in the upcoming 2017–2018 NHANES survey may help increase the statistical significance of our results.

#### MP4-11

##### Outcomes of primary transcorporeal artificial urinary sphincter placement in previously radiated patients

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**Introduction:** The artificial urinary sphincter (AUS) is the gold standard surgical treatment for male stress urinary incontinence (SUI). Patients with a history of radiation are 4.6 times more likely to have their device explanted for infection or erosion, with rates in the literature as high as 50% at two years. Transcorporeal AUS placement has been used primarily for AUS revisions and is thought to help mitigate the risks of recurrent urethral erosion after radiation by interposing tunica albuginea between the cuff and thin dorsal urethra. Our objective was to evaluate transcorporeal placement as an initial procedure in men with pre-existing erectile dysfunction and who have been treated with pelvic radiation, to evaluate if it improves explantation and revision rates.

**Methods:** We conducted an institutional review board-approved retrospective review from 2010–2019 of first-time AUS surgeries after pelvic radiation treatment for prostate cancer. Data, including stress incontinence outcomes, device outcomes, and radiation details, were collected. Basic descriptive statistics were performed and Fisher exact test were used to compare groups.

**Results:** Eighteen patients underwent transcorporeal AUS placement as their initial incontinence procedure after pelvic radiation (Table 1). Time from radiation treatment to AUS implantation date was, on average, 84 months (Table 2). With a total mean followup of 17 months, two patients (11%) required revisions of their AUS and two patients (11%) required AUS explant for infections. There was no statistically significant difference between age, radiation type, salvage vs. adjuvant radiation, or cuff size between groups with and without complications. Average time from AUS implant to AUS explant for infection or erosion was two months. Average time from AUS implant to AUS revision was 40 months (Table 2).

**Conclusions:** Transcorporeal AUS is a promising primary technique for SUI due to prostate cancer in previously irradiated patients. Despite a 11% explant rate and 11% revision rate within our cohort, this is lower than cited rates in the literature. A 2015 meta-analysis by Bates et al found that in radiated patients with AUS, 37.3% of patients required revisions. A prospective study between standard and transcorporeal techniques in the post-radiation setting is needed.

*This paper has figures, which may be viewed online at: <https://www.eventscribe.com/2019/nsaua/SearchByBucket.asp?pf=Track>*

#### MP4-12

##### Preoperative factors associated with perioperative complications in percutaneous nephrolithotomy

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**Introduction:** Percutaneous nephrolithotomy (PCNL) is a widely used procedure for large stone burden and in patients where retrograde approach is compromised. Our study aimed to analyze complication rates using the Clavien-Dindo modified system in regards to preoperative factors including frailty, renal function, hematocrit, stone burden, and body mass index (BMI).

**Methods:** We conducted a retrospective study of 149 out of 165 patients who underwent PCNL between January 2016 and January 2018 and met our inclusion criteria at our institution. In total, there were 171 PCNL procedures done within our study population since 2010. Chi-square and t-tests were used to compare demographics and surgery characteristics for the two groups.

**Results:** Overall, the complication rate in our study was 30.4%; of that, 32.6% were urinary tract infections (UTIs) with a 14% readmission rate. There were no significant differences in mean age, gender, BMI, preoperative hematocrit, or frailty score index and complication rate. Most of the complications seen were low-grade and associated with longer mean operative time (138 vs. 117 minutes;  $p=0.005$ ), hospital length of stay (2.8 vs. 1.4 days;  $p=0.01$ ), and stone burden (4 vs. 3 cm;  $p=0.005$ ). Preoperative chronic kidney disease (11.5 vs. 4.2%;  $p=0.0000001$ ) and secondary procedures (51.9 vs. 27.7%;  $p=0.023$ ) were also associated with greater complication rates.

**Conclusions:** Overall, PCNL is a safe procedure with mostly lower-grade Clavien complications. Prolonged surgery time must be balanced with secondary procedures to render a patient stone-free, as both factors were associated with perioperative complications. Preoperative chronic kidney disease and a larger stone burden also carried a higher risk.

*This paper has figures, which may be viewed online at: <https://www.eventscribe.com/2019/nsaua/SearchByBucket.asp?pf=Track>*

#### MP4-13

##### Internet search trends for topics in men's health

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**Introduction:** Medical information is becoming increasingly available to the public with the advent of modern technology and internet access. Google is arguably the most commonly used resource when searching for information. We researched the Google search trends of several topics related to men's health.

**Methods:** We used Google Trends (<http://google.com/trends>) to explore search trends for various search terms related to men's health in the U.S. over the past five years. When possible, these terms were searched as topics that cover a group of terms that share the same concept in any language. Search queries provided graphs depicting search volume as a function of time, geographic data, and related topics and queries. Graphs were compared to rank topics based on search volume. Isolated spikes in search volume were further explored to identify an inciting event. This included limiting the query to the dates corresponding to the spike and assessing the related queries provided by Google Trends.

**Results:** Erectile dysfunction was the most searched topic over the last five years in the U.S., more so in the Eastern states. Prostate cancer and benign prostatic hyperplasia followed as the second and third most searched topics, respectively. Other popular topics involved symptoms or pathologies of the testicles and penis. Most researched topics had relatively stable search volumes, with the exceptions of premature ejaculation and Peyronie's disease. Several of the observed spikes in search volume were indeed attributable to singular events, mostly in the form of online article publications or social media posts. In the case of Peyronie's disease, repeated spikes in search volume in 2018 may be related to airings of a television commercial discussing the topic. Geographic data provided little significant geographic variability and was often lacking.

**Conclusions:** Erectile dysfunction is the most popularly searched men's health topic. Google topic trends may be influenced by cultural events.

## MP4-14

### Patient-reported efficacy of onabotulinum toxin A for treatment of overactive bladder in the older adult

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**Introduction:** Overactive bladder (OAB) is a common condition, with epidemiologic studies showing a prevalence ranging from 11.8–16.5% for adults over the age of 18, and rising to up to 35% for those over the age of 40. Older adults are at an increased risk for cognitive impairment with second-line therapy anticholinergic medications. We aimed to evaluate patient-reported outcomes of third-line OAB therapy with onabotulinum toxin A based on patient reported OAB-V8 questionnaire responses, and to compare results between the geriatric (>65) and younger adult (<65) population.

**Methods:** All patients who received intravesical onabotulinum toxin A injections from April 1, 2016 through May 15, 2019 were queried. Data obtained from chart review included age at time of treatment, body mass index (BMI), gender, type of previous OAB treatment, diagnosis of neurological condition, and pre- and post-intervention OAB-V8 questionnaire responses. Patients who had not completed the OAB-V8 questionnaire received a followup phone call and were given the opportunity to complete the questionnaire. Chi-square analysis and two-sided t-test were used to compare groups, with significance at  $p < 0.05$ .

**Results:** Forty-three patients were identified based on clinic billing codes. Nine patients were excluded due to not receiving intravesical injections or due to receiving an alternative agent. Of the 33 patients identified, 16 were over 65 (mean 74, range 65–89) at time of treatment and 17 were under 65 (mean 47, range 18–62). No significant differences were seen in BMI, presence of underlying neurological condition, presence of diabetes, or number of second-line therapies failed. Both groups saw a significant decrease in symptom score following intervention, although symptom scores did not vary significantly among older and younger adults ( $p = 0.71$ ,  $0.86$ ). No significant differences were seen in patients continuing vs. discontinuing therapy ( $p = 0.96$ ).

**Conclusions:** Older adults showed significant improvements in reported bladder symptoms following intravesical onabotulinum toxin A injections for OAB treatment. No differences were seen in the rate of therapy discontinuation in this cohort when compared to younger adult patients. Further studies are needed to determine whether these findings persist or if failure of multiple anticholinergic agents is necessary in the older adult patient prior to proceeding to intravesical onabotulinum toxin A injections.

## MP4-15

### Reservoir-induced bladder rupture during inflatable penile prosthesis revision surgery

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**Introduction:** Bladder rupture is a rare complication of inflatable penile prosthesis (IPP) revision surgery. Current practice involves over-distention of the reservoir during revision surgery, which can increase the risk of this complication. There is limited literature describing this complication or providing recommendations regarding intraoperative or postoperative management. Our objective is to describe our experiences with this complication and propose ways to manage and possibly avoid this complication.

**Methods:** We retrospectively reviewed the charts of two patients who underwent IPP revision surgery complicated by bladder rupture. Intraoperatively, the existing reservoirs had been left in situ and over-distended to break the capsule according to common practice. Gross hematuria was noted in each case following this technique.

**Results:** Delayed identification of the complication occurred in the first case, while the complication was immediately recognized in the second case. The first patient returned to the operating room for complete penile prosthesis removal and replacement of component parts, including placement of an ectopic reservoir and foley catheter. He subsequently underwent bladder closure for persistent bladder leakage. The second patient underwent immediate removal of three-piece penile prosthesis and placement of a malleable prosthesis and foley catheter. Followup cystogram demonstrated the bladder had completely healed with con-

servative management alone. On followup, both patients were satisfied with their penile prostheses and able to engage in penetrative intercourse.

**Conclusions:** It is important to be vigilant in identifying and managing bladder rupture. It can be surgically managed with a malleable prosthesis or an alternative reservoir placement. This complication may be minimized if the reservoir is refilled but not over distended.

## MP4-16

### Looking beyond hypogonadism: Association between low testosterone and metabolic syndrome

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SUNY Upstate Medical University

**Introduction:** Men with low testosterone are routinely referred to urology clinics for intervention. It has been suggested that low testosterone is associated with metabolic syndrome, a harbinger for cardiac morbidity. Yet, this relationship remains unclear. The AUA guidelines state that ordering an HbA1c should be considered by urologists. Given the potential opportunity for earlier diagnosis of metabolic disorders among urologists, the goal of this study was to better define the relationship between low testosterone and metabolic syndrome.

**Methods:** The National Health and Nutrition Examination Survey (NHANES) database was queried for men 19–59 years of age between the years 2013 and 2016. We defined metabolic syndrome per the National Cholesterol Education Program (NCEP) ATP III criteria and hypogonadism as total testosterone <300 ng/dl as defined by the AUA. Sample weights were applied for sampling and non-response bias. We compared demographic, clinical, and hormone factors with Chi-square and t-tests, and then performed logistic regression.

**Results:** A total of 3350 men were included in this study, of which 24% had testosterone <300 and 26% had metabolic syndrome. Men with low testosterone were more likely to be older, have a higher body mass index (BMI), have higher HbA1c, lower high-density lipoprotein (HDL), higher triglycerides, higher fasting blood glucose, larger waistline, hypertension, and metabolic syndrome ( $p < 0.001$  for all). In the multivariate analysis, significant associations were seen between hypogonadism and larger waistlines, low HDL, and HbA1c 5.7–6.4 (odds ratio [OR] 4.26,  $p < 0.001$ ; OR 1.65,  $p = 0.01$ ; OR 1.61,  $p = 0.002$ , respectively). When stratifying by a younger age cohort (19–39), we found a stronger association with larger waistline (OR 6.52,  $p < 0.001$ ).

**Conclusions:** This study suggests that low testosterone is associated with risk factors of large waistline and low HDL among men 19–59 years old. Among young hypogonadal men, we identified an even stronger association with large waistline. Further studies are needed to better define the significance of this relationship and associations with metabolic syndrome.

## MP4-17

### Men's health in telemedicine: The current situation

S. Badkshian, M. Ernst, N. Belko, K. Chevli

University at Buffalo

**Introduction:** Men are less likely to seek out healthcare than women. This limited care is one factor contributing to delayed diagnoses and shorter lifespans for men. When asked why they don't pursue care, men often answer vaguely, citing busy schedules and feeling fine; however, there are larger underlying issues. Machismo attitude, fear of diagnosis, and discomfort with exams have all been shown to be contributing factors. To address this gap in care, several telemedicine companies have emerged and marketed themselves to young men in recent years. In this study, we identify these companies and evaluate the quality of their medical services.

**Methods:** A comprehensive review of companies focusing on men's health was performed. Their websites and digital media were analyzed. Particular attention was paid to each company's approach to diagnosis and management of erectile dysfunction (ED) by purchasing consultations for the same. Updated guidelines regarding ED were reviewed.

**Results:** Two direct-to-consumer start-up companies were identified as the industry leaders in men's telemedicine. Each openly advertises services



for the diagnosis and management of ED, androgenetic alopecia, oral and genital herpes, and premature ejaculation, albeit the former is the greatest advertising focus. Both companies are endorsed by experts in the fields of infertility, andrology, and sexual medicine. Patients seeking ED medications are offered a free visit and diagnosis in under two hours after answering a brief questionnaire, without any in-person doctor's visit. Upon approval, medications are shipped to your door the very next day along with an email from the physician reviewing your record. The email includes a standardized, yet comprehensive treatment plan detailing the mechanisms of action, side effects, and contraindications for the prescribed medication. Blood tests and health screens are optional, albeit recommended. Alternative treatment modalities are mentioned as well. Patients are given an opportunity to ask their providers questions via secured messages. Followup is encouraged.

**Conclusions:** Innovative solutions are needed to encourage men to seek healthcare for sensitive issues. Telemedicine offers potential solutions by allowing men to access this care from the privacy and comfort of their homes. Despite the reluctance of some patients, a thorough history, physical exam, and lab testing are important aspects of a full medical evaluation for ED.

#### MP4-18

##### Men's health in telemedicine: The standardized patient experience

S. Badkshan, M. Ernst, T. Maers, M. Shapiro, K. Chevi

University at Buffalo

**Introduction:** Erectile dysfunction (ED) is a significant and common medical problem. Recent epidemiologic studies suggest that up to 52% of American men suffer from ED, of which up to 25% are below the age of 40. Direct-to-consumer start-up companies have turned their attention to serving this population. Here, we describe the prescribing patterns for two of the leading telemedicine services in the U.S.

**Methods:** Three standardized patients suffering from ED were created and their information entered into two different men's health telemedicine services. Patient 1 is a 30-year-old male with sudden-onset ED with an established partner. He does not experience nocturnal tumescence and is unable to attain erections while masturbating. Patient 1 has no known medical issues. His physical exam and vital signs are within normal limits (WNL). Patient 2 is a 27-year-old male with sudden-onset ED with a new partner. He still experiences nocturnal tumescence and attains erections with masturbation. He has anxiety, but his physical exam and vitals are WNL. Patient 3 is a 31-year-old male with gradual-onset ED. He is able to attain erections with masturbation, but does not experience nocturnal tumescence. He leads a sedentary lifestyle, has a blood pressure of 140/90 mmHg, and has a family history of myocardial infarction. All questionnaires were answered using these standardized profiles.

**Results:** Both telehealth services requested credit card information prior to any medical review. One of the telehealth services charges a consultation fee, but waives the cost of each patient's first prescription. The other telehealth service provides a free consultation while charging only for medications if prescribed. This service also offers patients a choice in dosages and quantities of pills at various price points. Each standardized patient was prescribed the requested medications by a provider on both platforms based on the online questionnaires. Providers requested no further workup or lab work. It was noted that some of the providers were licensed physicians, but not board-certified. An email including a standardized, yet comprehensive treatment plan from each patients provider was included in both platforms.

**Conclusions:** The largest men's telehealth services are easy and affordable options for patients to seek out evaluation and prescription medications for ED. In our study, each of the complex standardized patients was prescribed his requested medication without any further workup, exam, or lab work. Further studies are needed to validate these findings.

#### MP4-19

##### Fail to rescue: Causes of mortality post-TURP

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University at Buffalo, VA Western NY Healthcare System

**Introduction:** While the complications, including 30-day mortality, of transurethral resection of the prostate (TURP) have been studied, there is a paucity of data regarding the relationship of specific complications on 30-day mortality. In this study, National Surgical Quality Improvement Program (NSQIP) data was used to evaluate the relationship between specific complications and 30-day mortality.

**Methods:** NSQIP data was queried for patients who underwent TURP between January 2014 and December 2016. A total of 18 007 patients were identified, of which 79 died within 30 days of surgery. Kaplan-Meier log rank analysis and cox proportional hazard models were performed to evaluate the relationship between potential complications and 30-day mortality. All statistically significant variables were then used in a multivariate analysis to evaluate the relationship and adjust for potential confounding factors.

**Results:** After adjusting for confounding factors, the patients with the following complications had an increased risk of mortality within 30 days of receiving a TURP on multivariate analysis (Table 1): cardiac complications (odds ratio [OR] 10.8; 95% confidence interval [CI] 5.0–23.5), respiratory complications (OR 12.3; 95% CI 5.6–26.7), pulmonary embolism (OR 5.7; 95% CI 1.6–20.5), acute renal failure (OR 4.7; 95% CI 2.1–10.4), and bleeding requiring transfusion (OR 3.1; 95% CI 1.6–6.1). Patients with postoperative sepsis were not found to have an increased risk of mortality within 30 days.

**Conclusions:** Although not very common, patients undergoing TURP may experience a variety of complications. Surgeons should be cautious when patients experience the abovementioned complications, which may be causes or predictors for 30-day mortality.

This paper has figures, which may be viewed online at: <https://www.eventscribe.com/2019/nsua/SearchByBucket.asp?pf=Track>

#### MP4-20

##### Stuttering priapism: Treatment challenges in the current healthcare infrastructure

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**Introduction:** Stuttering priapism is a recurrent form of ischemic priapism whereby painful prolonged erections occur repeatedly with intervening periods of detumescence. As recurrent episodes place a significant burden on healthcare resources, the ultimate management goal is to prevent future episodes. One proposed strategy for management combines the use of androgen blockade for long-term prevention, a treatment which takes several weeks to take effect. Intracavernosal phenylephrine injections are used in the interim for individual ischemic episodes. After androgen blockade effectively controls stuttering priapism episodes, phosphodiesterase type-5 (PDE-5) inhibitors can be considered to reset the corporal erectogenic pathway. This study presents the outcome of this strategy in a cohort of patients with stuttering priapism.

**Methods:** Treatment strategies and outcomes of five patients with stuttering priapism over five years, were retrospectively reviewed. Post-treatment feedback was obtained via a telephone survey.

**Results:** All five patients responded to emergency room treatments and avoided surgical shunting for acute ischemic episodes. Three of five patient received androgen blockade using leuprolide, a gonadotropin-releasing hormone agonist (GnRH-a), which was well-tolerated and resulted in normalized erections within 10–21 days. During this time interval, none of the patients were able to obtain phenylephrine for self-injections. All three of these patients had recurrence of their stuttering priapism after androgen blockade wore off. One patient had insurance coverage for a daily PDE-5 inhibitor and experienced control of recurrence while on preventative therapy. All five patients had additional emergency room visits.

**Conclusions:** Androgen blockade provides effective control of recurrent priapism episodes. Poor access to phenylephrine self-injections and daily

PDE-5 inhibitors prevent implementation of proposed treatment algorithms for prevention. Systems-based changes to improve access to these treatments could decrease the burden of disease on the patient, physician, and healthcare system.

#### MP4-21

##### **Tubeless ambulatory percutaneous nephrolithotomy: Initial 15-year experience from a single institution**

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Queen's University

**Introduction:** Percutaneous nephrolithotomy (PCNL) is the gold standard treatment for large renal calculi, and is typically regarded as an inpatient procedure. Tubeless ambulatory PCNL (aPCNL) has been shown to be a safe and effective procedure when adhering to strict discharge criteria in carefully selected patients. We report the outcomes over our initial 15-year experience with aPCNL to better define the safety and efficacy of this approach.

**Methods:** A retrospective chart review was conducted of all consecutive unilateral and bilateral ambulatory PCNL cases done at Kingston Health Sciences Center from January 1, 2004 to December 31, 2018. Preoperative, intraoperative, and postoperative data were collected,

including gender, age, body mass index (BMI), American Society of Anesthesiologists (ASA) score, stone type, number, size and location based on imaging. Safety of aPCNL was determined by assessing postoperative complications, emergency department (ED) visits, and hospital readmissions. Efficacy of aPCNL was determined by assessing radiographic stone-free rate.

**Results:** There were 118 patients included in our study. The mean patient age was 57 years, 48% were male and 52% were female. The average BMI was 30.8 kg/m<sup>2</sup>, and 45% of patients were ASA 3. The average stone size was 15.9 mm, and 25.4% of patients had multiple stones (more than 3); 6.8% of patients had bilateral PCNL and 5.9% of patients had staghorn stones. Intraoperatively, 97.5% of patients had ureteric stents placed and 2.5% of patients were entirely tubeless. Our stone-free rate was 83.2% (defined as no residual fragment greater than 3 mm); 16.9% of patients had a related ED visit within six weeks of their procedure and 5% of patients required an admission to hospital.

**Conclusions:** Ambulatory PCNL is a safe and effective treatment and patient selection and strict discharge criteria are still imperative for success. However, our data shows that despite performing aPCNL in more comorbid patients with more complex stones, a high stone-free rate and low hospital readmission rate can be achieved.

## Moderated Poster Session 5: Education

### MP5-01

#### Survey of Canadian urology programs: Which elements of the CaRMS application are the most important?

D. Nguyen<sup>1</sup>, J. Lee<sup>2</sup>, R. Valdivieso<sup>3</sup>, J. Franc-Guimond<sup>3</sup>, N. Bhojani<sup>3</sup>  
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**Introduction:** Determining which aspects of the application are most important when applying to residency programs can be challenging for students. Due to the lack of current and reliable information on the criteria for Canadian urology residency programs (CanURP), we set out to survey each program about which criteria of the application are the most important to further provide transparency and to offer the programs an idea of how their criteria compare.

**Methods:** An electronic survey was sent to all 13 CanURP (program directors and selection committees). It asked respondents to rate each aspect of the application on a five-point Likert scale. Following a 100% response rate from program directors, the same survey was sent to each selection committee member. A numeric mean score was calculated for each individual aspect surveyed to create an overall rank list of the components. Independent samples t-test (two groups) was used to compare the scores of program directors vs. program committee members and francophone programs vs. anglophone programs.

**Results:** A total of 43 urologists involved in the application process answered: all program directors and at least two members per selection committee. The three most important aspects overall were rotation performance at their institution ( $4.95 \pm 0.21$ ), quality of reference letters from a urologist ( $4.60 \pm 0.62$ ), and interview performance ( $4.49 \pm 0.63$ ). Table 1 provides the mean score, standard deviation, and rank of each individual aspect surveyed. There were no statistically significant differences between program directors and committee members for mean score of any aspect surveyed. Compared to anglophone programs, francophone programs gave a statistically more significant importance to French proficiency ( $p < 0.001$ ) and pre-clinical academic performance ( $p = 0.0272$ ), while giving less importance to English proficiency ( $p < 0.001$ ).

**Conclusions:** CanURP are similar in their ranking of clinical ability as the most important selection criteria. Previous research experience, especially outside of the field of urology, and future career ambitions matter less when considering future residents.

*This paper has figures, which may be viewed online at: <https://www.eventscribe.com/2019/nsua/SearchByBucket.asp?pfp=Track>*

### MP5-02

#### WATER vs. WATER II: Potential volume-independence of Aquablation

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**Introduction:** Surgical options are limited when treating large (>80 cc) prostates for lower urinary tract symptoms (LUTS) due to benign prostatic hyperplasia (BPH); there is a need for novel surgical approaches with shorter learning curves and effective treatment. Aquablation (AquaBeam System, PROCEPT BioRobotics, Inc., U.S.), an ultrasound-guided, robotically executed waterjet ablative procedure, could be this novel tool. This analysis compares the outcomes of Aquablation in 30–80 cc prostates with the outcomes in 80–150 cc prostates.

**Methods:** WATER (NCT02505919) is a prospective, double-blind, multicenter, international clinical trial comparing the safety and efficacy of

Aquablation and transurethral resection of the prostate for LUTS/BPH in men with a prostate between 30 cc and 80cc. WATER II (NCT03123250) is a prospective, multicenter, single-arm international clinical trial of Aquablation in men with a prostate between 80 cc and 150cc. Herein, we report baseline parameters and six-month outcomes in 116 WATER (W-I) and 101 WATER II (W-II) study subjects undergoing Aquablation. Students t-test or Wilcoxon tests were used for continuous variables and Fishers test for binary variables.

**Results:** Mean operative time was  $33 \pm 17$  minutes in W-I and  $37 \pm 13$  minutes in W-II. The average length of stay post-procedure was  $1.4 \pm 0.7$  days (W-I) vs.  $1.6 \pm 1.1$  days (W-II). Mean changes in International Prostate Symptom Score (IPSS) and IPSS quality of life were substantial, occurring soon after treatment and averaging (at six months) 16.9 and 3.5 points, respectively, in W-I and 17.4 and 3.2 points in W-II ( $p = 0.6046$  and  $0.2607$ , respectively). By three months, Clavien-Dindo grade 2 or higher events occurred in 19.8% of W-I subjects and 34.7% of W-II subjects ( $p = 0.4680$ ). One W-I subject (0.9%) and 6 W-II subjects (5.9%) required postoperative blood transfusion ( $p = 0.0517$ ). Both cohorts preserved erectile function. Additional characteristics and outcomes are listed in Table 1.

**Conclusions:** Aquablation clinically normalizes outcomes between patients with a 30–80 cc prostate and patients with an 80–150cc prostate treated for LUTS/BPH with an expected increase in the risk of complication. It is an effective and potentially volume-independent treatment of BPH with acceptable complications.

*This paper has figures, which may be viewed online at: <https://www.eventscribe.com/2019/nsua/SearchByBucket.asp?pfp=Track>*

### MP5-03

#### Diffusion and adoption of the surgical robot in urology

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**Introduction:** Over the last two decades, robotic surgery has become a mainstay in hospital systems around the world. Leading this charge has been Intuitive Surgical Inc's da Vinci robotic system (Sunnyvale, CA), with 4986 systems worldwide. The rapid rate of adoption and diffusion of the surgical robot has been propelled by many important industry-specific factors and we propose a model that explains the successful adoption of robotic surgery in urology.

**Methods:** The successful diffusion and adoption of the surgical robot in urology is rooted in the history of Intuitive Surgical itself. We deconstructed the timeline of the development of the surgical robot and corresponded this with the introduction of laparoscopy in urology. We identified technical limitations in laparoscopic prostatectomy that were overcome with robot-assisted laparoscopic prostatectomy. Additionally, financial statements from Intuitive Surgical were analyzed and we identified the recurring revenue model that has allowed Intuitive to overcome initial barriers to profitability. Finally, the appeal of the robot to patients was deconstructed. Through this analysis, we proposed a three-armed model consisting of the surgeon, hospital administrator, and the patient that explained the successful adoption of the robot in urology (Fig. 1).

**Results:** With regard to the surgeon, the introduction of the robot to radical prostatectomy significantly reduced the learning curve for minimally invasive prostatectomy, allowing its rapid adoption and diffusion. The hospital administrator was drawn to the robot due to its perceived fixed cost at initial purchase. However, upon closer examination of Intuitive's financial statements, it is clear that more than 50% of its revenue is from recurring



instrument and maintenance costs rather than the number of installed surgical robots. For patients, the FDA's limited regulation of direct-to-consumer marketing of medical devices allowed them to be flooded with information convincing them of the superiority of the robotic prostatectomy despite no level 1 evidence suggesting this to be the case. Finally, all three groups were lured by one key statistic: documented shorter hospital stays in the initial robotic prostatectomy literature.

**Conclusions:** Our three-point technology adoption model can be generalized to other robotic surgical procedures, as well as new medical and surgical technology. As the Intuitive surgical system continues to improve and as new robotic surgical systems are introduced, we propose that the successful appeal to the surgeon, hospital administrator, and patient will be the ultimate litmus test to determine the overall success of a new technology.

*This paper has figures, which may be viewed online at: <https://www.eventscribe.com/2019/nsaua/SearchByBucket.asp?pfp=Track>*

#### MP5-04

##### **A retrospective review of the Rezum system: Treatment for benign prostatic hyperplasia in men with mild, moderate, and severe lower urinary tract symptoms**

M. Babar, M. Ines, S. Singh, S. Hamdani, M. Ciatto, D. Schnapp  
DSS Urology

**Introduction:** The Rezum system, a minimally invasive treatment, is a convective radiofrequency water vapor thermal therapy used to treat lower urinary tract symptoms (LUTS) due to benign prostatic hyperplasia (BPH). We report 12-month results from two urologists in a single clinical setting for men with mild, moderate, and severe LUTS.

**Methods:** A total of 152 men, aged 38–82 years, with International Prostate Symptom Scores (IPSS) 2 and prostate volumes (PVs) from 18–111 cc, were included in a retrospective review of the Rezum system. IPSS, quality of life (QoL), and adverse events (AEs) were proactively collected over the phone. The primary endpoint was to evaluate IPSS and QoL reduction for men with mild, moderate, and severe LUTS at six months. They were assessed for AEs, BPH medication usage, and PV reduction over 12 months.

**Results:** For men with moderate LUTS, mean IPSS and QoL decreased from baseline (14.0, 3.9) up to 12 months (9.4, 2.1), respectively. Similarly, for men with severe LUTS, mean IPSS, and QoL decreased from baseline (25.2, 4.4) up to 12 months (11.5, 2.7), respectively. For men with mild LUTS, mean IPSS increased from baseline (5.2) to one month (10.1) and then showed no significant change up to 12 months (5.1). Additionally, mean QoL showed no significant change from baseline (2.9) to one month (3.0) but decreased from baseline at three, six, and 12 months (2.1, 1.0, 1.2), respectively (Table 1). At six months, the mean PV reduction from baseline for all men was 30% and 68% stopped all BPH medications. No significant change in AE occurrence was observed between men with mild and moderate-severe LUTS (Table 2).

**Conclusions:** Based on improvements in IPSS and QoL, the Rezum system effectively treats men with moderate and severe LUTS. IPSS showed no change from baseline to six months for men with mild LUTS; however, QoL improved at six months for men with mild LUTS, and AE occurrence was consistent across all LUTS categories. Therefore, the Rezum system is also a viable treatment for men with mild LUTS.

*This paper has figures, which may be viewed online at: <https://www.eventscribe.com/2019/nsaua/SearchByBucket.asp?pfp=Track>*

#### MP5-05

##### **Kidney tumor detection using molecular chemical imaging: Development of an innovative, non-invasive intraoperative imaging device**

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**Introduction:** Visualization and complete resection of tumors during extirpative surgeries can be challenging. Currently, there is no intraoperative device to differentiate tumor from normal tissue in real time with high accuracy. We are developing a non-invasive intraoperative molecular chemical imaging (MCI) device for detecting critical structures in real

time without the use of contrast agents. MCI is achieved by incorporating molecular spectroscopy and digital imaging. Used in conjunction with advanced algorithms, machine learning, and computer vision strategies, MCI generates enhanced visualization of tissue structures and enables differentiation of tumors from normal tissue.

**Methods:** We studied 22 human kidneys after radical nephrectomies with the diagnosis of renal cell carcinoma (RCC). During data collection, intact and sectioned specimens were exposed to white light, without contrast materials, and the light reflected from the tissue was analyzed by the MCI device operating in the visible and near-infrared (Vis-NIR) regions. The location of the tumor was confirmed by a surgeon and pathologist. Score images discriminating tumor from non-tumor tissue were generated from MCI collected data, using both multivariate (such as partial least squares discriminant analysis, PLS-DA) and univariate classification methods. Discrimination performance was determined by comparing metrics such as signal-to-noise ratio (SNR), area under the receiver operating characteristic curve (AUROC), sensitivity, and specificity.

**Results:** All parts of the tissue, including renal cortex, medulla, hilum, capsule, perirenal fat, and RCC tumor were included in the analyses. The PLS-DA model for tumor discrimination exhibits high performance with 94% accuracy, 89% sensitivity, 95% specificity, and 0.96 AUROC. Tumor score images generated from the PLS-DA model display tumor/non-tumor contrast with an average SNR of 7 and average AUROC of 0.98. Corresponding univariate-based score images also show significant tumor/non-tumor contrast, with average SNR 10 and average AUROC of 0.98.

**Conclusions:** The positive results demonstrate the potential of MCI technology for augmenting a surgeon's ability to accurately identify and excise kidney tumor without the use of contrast agents. This innovative imaging modality has the capability of being used for other forms of extirpative surgeries.

#### MP5-06

##### **Does the Rezum system effectively treat lower urinary tract symptoms in men with prostate cancer?**

M. Babar, M. Ines, S. Singh, S. Hamdani, M. Ciatto, D. Schnapp  
DSS Urology

**Introduction:** Men with prostate cancer (PCa) often complain of bothersome lower urinary tract symptoms (LUTS). The Rezum system, a convective radiofrequency water vapor thermal therapy for benign prostatic hyperplasia (BPH), effectively treats men with LUTS but its palliative effects in patients with PCa has yet to be studied. We report 12-month outcomes of the Rezum system for PCa patients with bothersome LUTS.

**Methods:** A retrospective review was performed for men who had a Rezum treatment in a single office between 2017 and 2018 and had baseline values for international prostate symptom score (IPSS) 7, quality of life (QoL), prostate-specific antigen (PSA), and prostate volume (PV). Postoperative retention rates and changes in IPSS, QoL, PSA, and PV were compared between a PCa group of eight men who were diagnosed with PCa prior to treatment with Rezum, and a cohort of 98 men who had a Rezum treatment during the same period. Followup IPSS and QoL, PSA, and PV were obtained at 12 months, 6–12 months, and 3–6 months. Statistical differences from baseline to followup were determined using a paired Students t-test while statistical differences between the two groups were determined using the Fishers exact test and one-sample t-test.

**Results:** The mean ages for the PCa and cohort groups were 69.8 and 63.0 years, respectively. Five patients had treatment for PCa (63%) (four men had radiation [50%], one had hormone therapy [13%]) while three were on active surveillance (38%). For the PCa group, changes in mean IPSS, QoL, and PV from baseline (17, 3.9, 55.5) to followup (6.7, 1.7, 41.5) showed statistical significance. Similarly, the cohort group had statistically significant changes in mean IPSS, QoL, and PV from baseline (18.1, 4.4, 48.5) to followup (10.8, 2.7, 31.4). For both PCa and cohort groups, respectively, there was no statistical significance for changes in PSA from baseline (7.1, 3.5) to followup (5.3, 3.5). Between the two groups, there was no statistical difference for changes in IPSS, QoL, PSA, and PV (Table 1). Additionally, there was no statistical difference in postoperative retention rates between the PCa (25%) and the cohort groups (13%) (p=0.316).

**Conclusions:** Based on improvements in IPSS, QoL, and PV, the Rezum

system effectively treats LUTS not only in men with BPH but also in men with PCa.

This paper has figures, which may be viewed online at: <https://www.eventscribe.com/2019/nsaua/SearchByBucket.asp?pfp=Track>

## MP5-07

### The value of the urology rotation in medical student education

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**Introduction:** Several articles in recent years demonstrate the paucity of urologic education in medical school. While only a small percentage of students will choose a career in urology, nearly half will enter primary care. A number of common urologic conditions are encountered by all physicians, necessitating medical students' education to include urologic knowledge. At our institution, students cover urology in their didactic years; during that time, the only clinical exposure to the subject is a single standardized patient session to learn the relevant physical exam. A two-week urology rotation is one of several surgical subspecialties third- or fourth-year medical students may choose as an elective. Curricular goals are in place; however, there is currently no tool to measure, nor a standard method of teaching across multiple clerkship sites. Our goal was to assess whether a targeted teaching approach will improve medical student knowledge of urology, using an objective measurement of learner progress.

**Methods:** Categories of common urologic conditions were identified using both the American Urological Association's Medical Student Curriculum (MSC) and the most common urologic consults from primary care. Two faculty members and two residents designed a 26-question exam based on these resources. The exam was given to students rotating at the VA Western New York Healthcare system on the first day of their urology rotation to assess baseline knowledge of common urologic conditions. Students were then provided the MSC. Each day, a topic was assigned in preparation for a 20-minute discussion led by a faculty member the next day; discussion included the faculty, students, and residents. Each two-week rotation covered the same topics, which included all subjects on the assessment. On the last day of the rotation, each student repeated the exam. Individual scores were then compared to the initial grades to assess improvement in knowledge.

**Results:** Preliminary data were collected for 10 students rotating through urology between January and May 2019. The average pretest score was 44.88%. Post-test scores averaged 77.37%.

**Conclusions:** The improvement in student test scores indicates that students had improved knowledge of urology after their elective rotation. To ensure this progress is related to our intervention, as opposed to the standard participatory learning, will be determined when we next randomize students into intervention vs. no intervention groups.

## MP5-08

### Evaluating the profitability metrics of robotic surgery

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University of Pittsburgh Medical Center

**Introduction:** Robotic-assisted laparoscopic surgery has often been termed a fixed-cost investment and, consequently, some hospitals base their decisions to purchase a robotic console on their ability to recoup the initial cost of the system. However, many of these economic models fail to account for variable costs associated with instrument exchanges and service contracts. In this study, we aim to analyze the cost structure associated with robotic surgery.

**Methods:** Using Intuitive Surgical's 10-K filings with the SEC from 2009–2018, we examined trends in procedures performed, number of installed bases, revenue (categorized into recurring versus fixed revenues), net income, and number of total patents. We compared the number of worldwide procedures to systems revenue, instrument revenue, service contract revenue, and total profits. Spearman correlation coefficients and two-tailed p-values were calculated for these pairs.

**Results:** There was a statistically significant correlation between worldwide procedures and instrument revenue ( $r=1.000$ ,  $p<0.001$ ), service contract revenue ( $r=1.000$ ,  $p<0.0001$ ), and total profits ( $r=0.81$ ,  $p=0.007$ ),

but not system revenue ( $r=0.61$ ,  $p=0.07$ ). During this time, the percentage of recurring revenue (contracts and instruments) relative to total revenue increased from 53% to 71%.

**Conclusions:** These data support the hypothesis that Intuitive Surgical follows a razor/razor-blade business model in which revenues are primarily driven by worldwide procedures, not from number of installed bases. From a hospital's perspective, the primary cost of buying a da Vinci surgical system is not the console itself but the recurrent costs associated with each procedure.

This paper has figures, which may be viewed online at: <https://www.eventscribe.com/2019/nsaua/SearchByBucket.asp?pfp=Track>

## MP5-09

### An improvised surgical sewing machine for complex reconstructive urologic surgery

J. Phelps, K. Scott, S. Blakely, G. Bratslavsky, D. Nikolavsky

SUNY Upstate Medical University

**Introduction:** Buccal mucosal graft (BMG) is commonly employed in reconstructive urologic surgery. Graft fixation can be especially challenging in complex cases involving poorly accessible surgical areas. We developed and implemented a surgical sewing machine to improve the efficiency of quilting and suturing in these challenging spaces. Our objective is to demonstrate the ease and feasibility of this technique for a variety of reconstructive surgeries incorporating BMG.

**Methods:** We retrospectively reviewed the charts of all patients who underwent surgery with the assistance of the improvised surgical sewing machine. All patients were confirmed to have strictures preoperatively and consented for reconstructive surgery with BMG. Intraoperatively, the stenosed segments were incised and BMG was harvested. The graft was then quilted using the device composed of materials readily available in the operating room. The device was easily assembled by threading an absorbable barbed suture through a hollow needle. The suture was deployed in and out of the tissue with the application of gentle pressure after the parts lacking the barb were removed. The barbs held the suture in place for creation of a continuous running suture that effectively secured the graft. Postoperatively, patients were seen in the early postoperative period and then followed at four-month intervals to assess for disease recurrence, graft survival, and suture resorption.

**Results:** A total of eight patients (six men, one woman, and one trans-female) with a mean age of 57 years (29–79) underwent BMG quilting with the improved surgical sewing machine between January 2017 and May 2019. Surgeries in which the technique was used included four posterior urethroplasties, one transvesical bladder neck reconstruction, one augmented urethrostomy, one female dorsal onlay BMG urethroplasty, and one revision vaginoplasty. Of these, three patients had prior pelvic radiation, which is known to be associated with decreased graft survival and increased risk of recurrence. At an average followup of 51 weeks (6–115), there was no disease recurrence and graft survival was demonstrated in all patients. Suture resorption occurred between 12 and 20 weeks postoperatively.

**Conclusions:** The improvised surgical sewing machine can be used in a variety of complex reconstructive surgeries, including those involving radiated tissue, where graft fixation and suturing is challenging, without compromising surgical outcomes. In addition, this technique has the potential for future applications in endoscopic and laparoscopic surgery.

## MP5-10

### Ex vivo cultured autologous liquid buccal mucosa graft

G. Li, K. Scott, J. Manwaring, D. Nikolavsky, T. Cazza, G. Bratslavsky, L. Kotula

SUNY Upstate Medical University

**Introduction:** Urethral reconstruction can be limited by the amount of buccal mucosa graft (BMG) available for harvest. Cultured autologous buccal mucosa cells may be a promising alternative to traditional BMG. As a concept, liquid BMG is produced by growing and expanding buccal mucosa cells ex vivo before suspending the cells in a liquid carrier. Our hypothesis was that liquid BMG could be injected into the urethral defect created by direct vision internal urethrotomy (DVIU), and the buccal

mucosa cells would survive locally and reproduce recognizable buccal mucosa architecture. Our aims were: 1) to grow and expand the buccal mucosa cells ex vivo; and 2) to detect the buccal mucosa cells locally after injecting the liquid BMG.

**Methods:** Ex vivo expansion and injection of buccal mucosa cells were conducted using six rabbits. Each rabbit underwent a punch biopsy of buccal mucosa. These were processed to yield individual epithelial cells and then plated in collagen-coated culture wells. The epithelial cells were co-cultured in a 6:1 ratio with fibroblasts. After 3–4 weeks in culture, the cells were detached, suspended in diluted fibrin glue, and injected over a DVIU defect in the urethra. Animals were euthanized 3–4 weeks after the treatment and H&E stained urethral specimens were evaluated for presence of buccal mucosa by a pathologist.

**Results:** Buccal epithelial cell cultures from six animals were expanded to produce a median of  $5.7 \times 10^5$  cells (range  $3.4 \times 10^4$ – $9.5 \times 10^5$ ) for a pericatheter injection. H&E evaluation of the harvested urethra did not show presence of buccal mucosa architecture following cells injections in the six rabbits.

**Conclusions:** A small number of individual cells injected into the urethra do not appear to replicate buccal mucosa architecture after re-injection. Further studies with other animal models and refinements of the technique are warranted. Fluorescently-labeled cultures of epithelial cells are being investigated to detect engraftment in the urethra. The liquid graft concept may allow for a wide range of applications in minimally invasive transluminal operations.

## MP5-11

### Strong conflict of interest policies have no effect on industry relationships in academic urology departments

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University of Pittsburgh School of Medicine

**Introduction:** Industry interactions can influence physician practice patterns, thus leading to a federally mandated open payments database and conflict of interest disclosures. We aimed to examine relationships between conflict of academic urology department interest (COI) policies and the amount of industry dollars accepted by faculty.

**Methods:** A total of 131 urology programs were invited to participate in an online survey assessing policies on industry-sponsored gifts, meals, events, education, consulting, speaker bureaus, representative relationships, and disclosure. Survey responses were scored as either a model policy (3 points), moderate policy (2), poor policy (1), or incomplete policy (0) according to the American Medical Student Association scorecard grading system. Summary scores were calculated and categorized as grade A >85% (strong policy), B >72% (moderate policy), C >56% (poor policy), and I <54% (incomplete policy). The 2016 open payment data were collected from the Centers for Medicare and Medicaid database and matched with faculty name and institution information manually obtained from publicly available department websites. Total general payments to department faculty were compared with COI policy scores using Fishers exact, Wilcoxon rank sum, and Spearman's correlation tests.

**Results:** Fifty-seven programs (44%) responded to the survey. There were no significant differences between AUA section, median industry dollars to department, and median dollars per payment among survey responders and non-responders. There was no relationship between median annual dollars to department faculty and policy strength (Table 1), however, higher total payments to flagship hospitals were moderately correlated with stronger policies (Spearman's  $\rho=0.35$ ,  $p=0.007$ ). Programs with the strictest policies discourage gifts (75%) and meals (60%), and require all faculty to disclose COIs (96%). Most policies allow faculty to consult (77%) and meet with pharmaceutical (70%) and device (75%) representatives. Policies were split with regards to industry-sponsored speaker bureaus and education.

**Conclusions:** Strong COI policies do not appear to influence the amount of money urologists accept from industry. Therefore, policies alone may not be sufficient to guide conflict of interest decisions by faculty.

*This paper has figures, which may be viewed online at: <https://www.eventscribe.com/2019/nsaua/SearchByBucket.asp?pf=Track>*

## MP5-12

### Robot-assisted synchronous bilateral nephrectomy for autosomal dominant polycystic kidney disease

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University of Rochester

**Introduction:** Autosomal dominant polycystic kidney disease (ADPKD) is a major cause of end-stage renal disease (ESRD) necessitating bilateral nephrectomy in a significant proportion of patients. Laparoscopic, hand-assisted laparoscopic, and robot-assisted bilateral nephrectomies have gained popularity in recent years in the quest to lessen the invasiveness of open surgical approaches. Herein, we describe our technique of robot-assisted synchronous bilateral nephrectomy for ADPKD.

**Methods:** Given prior abdominal surgery/transplant in most patients, we prefer an open cut-down access to place a 15 mm port 10 cm below the umbilicus in the midline. Four (8 mm) robotic trocars are placed under vision in a fan distribution along the umbilical level. The operating table is placed in reverse Trendelenburg (15 degrees) and tilted opposite to the targeted side. Provided there are no concerns for malignancy, some cysts encountered in large kidneys (>2.5 L) may require puncture to facilitate access and mobilization. The resected kidney is placed in a large bag and tucked in the pelvis. A similar procedure is carried out on the contralateral side after re-docking the robot and tilting the table in the opposite direction. The specimen bags are extracted by elongating the lower midline 15 mm port site.

**Results:** Of 15 synchronous robotic bilateral nephrectomies (from 2009–2018) in our prospective database, there were seven cases performed for ADPKD (December 2015 to December 2018). Median (interquartile range [IQR]) values for patient demographics were: age 59 years (47–63), body mass index 29 (26–32), Charlson comorbidity index 5 (3–7) and American Society of Anaesthesiology grade 3. Three patients had prior deceased donor transplant and four had prior living donor transplant. Of these, two had prior peritoneal dialysis and three had hemodialysis. Indication for nephrectomy were: pain (5), hemorrhage into cysts (3), and renal masses (2). Perioperative outcomes were: operating room time 388 minutes (324–453), estimated blood loss 200 ml (75–300), hematocrit change 5 (3.5–7.5), hemoglobin change 1.3 (0.9–2.5), transfusion 0, length of hospital stay three days (1.5–3.5), and two Grade I Clavien-Dindo complications. All patients were alive at a median followup of 3.8 years.

**Conclusions:** Robot-assisted synchronous bilateral nephrectomy is safe and effective in ADPKD even in the context of prior renal transplant patients with attendant comorbidities.

## MP5-13

### A qualitative assessment of urologic call coverage at a multi-hospital academic residency training program

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University of Pittsburgh Medical Center

**Introduction:** In our residency program, junior residents (PGY-2 and -3) previously covered five hospitals every 5–7 nights and then completed a regular work period the following day (home call). We recently transitioned to a night float system, where a resident provides coverage 6 pm to 6 am one month at a time and is off duty during the day. We evaluated the two systems to help guide future quality improvement.

**Methods:** A survey was administered to junior residents, senior residents (PGY-4+), and faculty to evaluate preferred system, as well as four domains using a five-point Likert scale (1-very poor to 5-very good): patient care, communication, quality of life, and resident education. A separate survey was administered to ward nurses evaluating promptness, availability, knowledge of patients, respect, communication, and ability to identify the on-call resident. Both surveys were administered four months before and after the transition. Finally, biometric sleep data was compared for home call, nights off, and night float using actigraphy.

**Results:** Response rates were 100% (11/11), 80% (8/10), and 95% (19/20) for junior residents, senior residents, and faculty, respectively. Survey data is shown in Tables 1 and 2. Nurses rated night float as a significant improvement for availability, respect, and ability to identify the resident



on call (all  $p < 0.01$ ). Median duration of sleep (hours) was 2.2 (interquartile range [IQR] 1.3–3.5), 6.6 (IQR 6.1–7.6), and 6.7 (6.5–7.0) for home call, nights off, and night float, respectively ( $p < 0.001$  home vs. night float). **Conclusions:** Physicians and nursing perceived night float to improve multiple domains, and residents slept more on night float. Ongoing work will assess durability of these benefits and how the new system impacts surgical training.

*This paper has figures, which may be viewed online at: <https://www.eventscribe.com/2019/nsaua/SearchByBucket.asp?pf=Track>*

### MP5-14

#### Burnout, moral injury and their impact on career choices of female urologists

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**Introduction:** Urologists have been identified as the physicians with the highest rate of burnout based on the 2019 National Physician Burnout, Depression & Suicide Report. Women, in particular, have been reported to have higher burnout rates compared to their male counterparts. More recently, moral injury has been proposed as an alternative to the label burnout, however, it is unclear how many physicians experience this in addition to other stress-based disorders. Our objective is to assess how burnout and moral injury impacts the career choices of female urologists.

**Methods:** An anonymous 10-question survey was posted in a female urology social media site. Demographic information, identification with moral injury based on a provided definition, and validated screening questions for burnout, post-traumatic stress disorder (PTSD), and depression were queried. Retirement plans were assessed separately.

**Results:** The survey was posted to a group of 716 female urologists. A total of 55 (8%) of urologists responded to the survey. The majority (76%) of responders were in practice  $< 10$  years. A total of 33 (60%) screened positive for burnout and 37 (67%) identified as experiencing moral injury, while 24 (44%) endorsed feelings of both burnout and moral injury. In addition, 39 (71%) screened positive for PTSD and 14 (25%) screened positive for depression. Ten (18%) urologists who experienced both burnout and moral injury also screened positive for PTSD and depression. Although 28 (51%) stated they would still pursue a career in urology, 28 (51%) stated retirement plans were impacted by burnout or moral injury with 30 (55%) planning to retire before the age of 60.

**Conclusions:** While this study is limited by selection bias and a small sample size, it reflects a high rate of burnout and moral injury among female urologists. This cohort is considering early retirement, which is concerning given the growing shortage of urologists.

### MP5-15

#### e-Visit — Urology care at the comfort of your home

E. Abara

Northern Ontario School of Medicine

**Introduction:** Since 2006, Ontario Telemedicine Network (OTN) has made contribution towards improving timely access to quality healthcare in the province. Home video visits for chronic disease management is well-established. A pilot project to evaluate the role of e-Visit in an office urology practice was undertaken between June 6, 2018 and June 5, 2019.

**Methods:** Approval by the OTN to participate in this pilot was obtained. Training of the urologist and office staff was completed. Enrollment of patients was by informed consent. All participants need to have internet connection, an email account, and a personal computer (with web cam, speaker, and microphone) or a tablet/smart phone. Steps to prepare for an e-Visit include: email invitation, testing connection/device, and installation of the app/plug-in. On the day of the visit, patients open the invitation email at the scheduled time and click on *Join Video Visit* to connect with the urologist. Post-visit survey follows. Patients under age and those with limited technical skills are assisted by parents, relatives, or primary healthcare providers. Patients' demographics, diagnoses, and reason for encounter were recorded.

**Results:** There were 118 patients: 70 male and 48 female aged between seven days and 96 years. Patient encounters included followup to review

test results and surgical outcomes (70), counselling (43), and consultation (5). There was a wide range of urologic diagnoses. Patients rated their experience of the e-Visit with such comments as "time-saving," "convenient," "no traffic jam." There were a few technical glitches and phone consultation completed the session.

**Conclusions:** e-Visit home video is here to grow in office urology practice. Collaborative enrollment of more participants in multiple sites is required to better understand the benefits and challenges.

### MP5-16

#### Substantial gender gap in industry relationships and scholarly impact among academic urologists

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<sup>1</sup>University of Pittsburgh; <sup>2</sup>Shanghai Jiao Tong University School of Medicine

**Introduction:** Gender inequality in industry financial relationships are described in other surgical subspecialties. We aimed to examine industry payments and scholarly impact among academic urologists.

**Methods:** This is a cross-sectional study of open-access data. Academic faculty from 131 urology training programs with publicly available websites were compiled. Gender, academic position, fellowship training, and scholarly impact (H-index and total publications) were recorded for each surgeon. Industry contributions were paired to names using the 2016 Centers for Medicare and Medicaid Services (CMS) open payments database. We compared industry payments and scholarly impact between genders with Fishers exact, Wilcoxon rank sum, and Spearman's rank-order tests. We used multivariable logistic regression modeling to determine predictors of receiving payments in the top quintile (20 percent).

**Results:** Among 1657 academic urologists, 84% were male and 16% female. While there were no differences in the number of male and female urologists receiving at least one industry payment, male urologists received more total funding than females ( $p < 0.001$ ) and higher median general payments per capita ( $p < 0.03$ ) (Table 1). Males also received more speaker fees ( $p = 0.03$ ), research payments ( $p = 0.002$ ), and higher median consulting fees ( $p = 0.003$ ). After stratifying by fellowship training and academic rank, fellowship-trained males received higher median general payments than female colleagues ( $p < 0.04$ ) and there were no differences between gender and rank. Overall, males had higher scholarly impact than females ( $p < 0.001$ ), and male H-index scores correlated with total industry payments ( $\rho = 0.27$ ,  $p < 0.001$ ). Predictors of receiving top 20% payments include male gender, associate professorship, and H-index score 10 (adjusted odds ratio [aOR] 2.29, 95% confidence interval [CI] 1.26–4.51; aOR 1.57, 95% CI 1.03–2.39; aOR 2.41, 95% CI 1.58–3.71, respectively).

**Conclusions:** Most academic urologists accepted at least one industry payment in 2016, however, males received more funding than females. More research is needed to understand why gender and scholarly productivity are associated with higher payouts. This is another important area that may influence career advancement and compensation for female urologists.

*This paper has figures, which may be viewed online at: <https://www.eventscribe.com/2019/nsaua/SearchByBucket.asp?pf=Track>*

### MP5-17

#### Rezum water vapor thermal therapy for lower urinary tract symptoms (LUTS) due to benign prostatic hyperplasia (BPH): Durable 4-year results from randomized controlled study

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**Introduction:** A randomized, controlled trial of water vapor thermal therapy was conducted to treat moderate to severe lower urinary tract symptoms/benign prostatic hyperplasia (LUTS/BPH) and to determine minimal important differences in International Prostate Symptom Scores (IPSS) associated with perceptible changes in quality of life (QoL).

**Methods:** There was a total of 188 subjects in active arm: 135 men, 50-years-old, IPSS 13, maximum flow rate (Qmax) 15 ml/s, and prostate volume 30–80 cm<sup>3</sup> treated with Rezum<sup>®</sup> system thermal therapy; they were

followed for four years. A subset of 53 men re-qualified for crossover from control to active treatment and was followed three years.

**Results:** IPSS, QoL, Qmax, and BPH impact index improved approximately 50% and remained consistently durable throughout four years ( $p < 0.0001$ ) (Fig. 1); crossover subjects had similar sustained outcomes. At four years, surgical retreatment rate was 4.4%; BPH medication resumption rate was 5.2%. Sexual function was preserved. IPSS and QoL scores strongly correlated; a mean IPSS change corresponding to a one-point QoL improvement is approximately -5 points for IPSS 13–19, -8.2 for IPSS 20–26, and -11.7 for severest LUTS of IPSS 27–35.

**Conclusions:** Rezm thermal therapy provides effective symptom relief and improved QoL with durability over four years, has limited impact on sexual function, and is applicable to all prostate zones, with procedures performed under local anesthesia in an office setting.

*This paper has figures, which may be viewed online at: <https://www.eventscribe.com/2019/nsaua/SearchByBucket.asp?pfp=Track>*

## MP5-18

### Liquid buccal mucosa graft for endoscopic reconstruction

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**Introduction:** In a previously reported pilot study, we described a liquid buccal mucosal graft (BMG) for treatment of urethral strictures. This was derived from an attempt to combine the advantages of endoscopic direct vision internal urethrotomy (DVIU) and open augmented urethroplasty. While minimally invasive DVIU leaves the incised area exposed to urine, a graft used in augmentation urethroplasty covers the urethral defect. Our proposed method is designed to simplify transurethral graft delivery and fixation by transurethral injection of minced BMG micro-grafts suspended in fibrin glue. We hypothesized that mechanically minced liquid BMG (LBMG) would engraft in the urethra and improve outcomes of DVIU in a validation study.

**Methods:** A rabbit stricture model was used to test this technique. The number of animals needed was calculated to achieve 82% power. Strictures were induced by electroresection in 27 rabbits as demonstrated on retrograde urethrograms (RUG) and urethroscopy. The animals were randomized into two groups: 1) treatment with DVIU and LBMG suspended in fibrin glue; and 2) control with DVIU and injection of fibrin glue only. Treatment animals had an 8 mm punch biopsy BMG minced into <5 mm micro-grafts, suspended in fibrin glue to create LBMG, and injected at the urethrotomy sites after a urethral catheter was placed across the DVIU wound. Animals were sacrificed at 24 weeks. Prior to sacrifice, animals underwent repeat RUG and urethroscopy by a surgeon blinded to the treatment arm. Radiographic images and histological specimens were examined by a radiologist and pathologist, both blinded to the treatment arm. Radiographically, stricture treatment was considered a success if a diameter measured on RUG had increased by at least 50%. Histological specimens were assessed for presence of BMG engraftment, and evaluated for the degree of fibrosis, acute and chronic inflammation.

**Results:** Eight of the 12 treated animals (67%) demonstrated engraftment of LBMG on histology. Seven of 12 treated (58%) and four of 13 controls (31%) showed improvement of strictures on RUG. The median percent increase in stricture diameter was 59% and 41.6% for treatment and control groups, respectively ( $p = 0.145$ ). There was no statistical difference between treatment and control groups in analysis of fibrosis or inflammation.

**Conclusions:** This proof-of-concept study demonstrated feasibility of minced LBMG use for endoscopic urethral stricture repairs. While a majority of treatment animals showed radiographic improvement in their strictures, the differences in success rates of treatment vs. control group were not statistically significant.

## MP5-19

### Influence of hierarchy on risk communication during robot-assisted surgery

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**Introduction:** The hierarchical culture of the operating room compounds risk in communication leading to poor outcomes. In this study, we aimed to identify how the surgical teams hierarchical relationships affect the frequency and timing (proactive vs. reactive) of risk utterances and their influence on situational awareness in the operating room (NOTECHS).

**Methods:** Audio-visual recordings and transcriptions of 10 robot-assisted radical prostatectomies were examined for risk utterances between the surgeon, assistant surgeon, bedside assistant (PA), and scrub nurse. Utterances were classified based on the sender-recipient pair (e.g. surgeon to bedside assistant), their timing (proactive vs. reactive), and the NOTECHS situational awareness score. Utterances made by the surgeon or assistant surgeon were also classified based on their on-console status. Chi-square tests and ANOVAs were used to determine associations between hierarchical status, utterance timing, on-console status, and NOTECHS scores.

**Results:** Of 4583 examined utterances, 275 (6%) were related to risk. Utterances made by the surgeon or assistant surgeon had significantly higher NOTECHS scores when they were off rather than on the console (1.8 vs. 2.4). These utterances were more reactive on the console (32%) and more proactive off the console (28%). Proactive utterances had significantly higher NOTECHS scores than reactive scores (2.5 vs. 1.8). The assistant surgeons communication patterns mimicked those of the surgeon, as shown by the NOTECHS scores when on and off the console.

**Conclusions:** The head of hierarchy in the robot-assisted surgical operating room is determined by the surgeon on the console.

## MP5-20

### Improving situation awareness for the console surgeon utilizing a live bedside video feed: A feasibility study

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**Introduction:** In robot-assisted surgery (RAS), unlike traditional open surgery, the surgeon is spatially isolated from the operating room (OR) team. This can lead to frustration and avoidable delays due to a lack of awareness by the surgeon. The objective of this pilot study was to investigate the feasibility and usability of providing the console surgeon with a live video feed of the patient bedside, mounted on the console, to support information communication and reduce workload.

**Methods:** A set of 10 robot-assisted radical cystectomies and prostatectomies were observed with the live video feed played on a tablet mounted beside the right foot pedal of the da Vinci<sup>®</sup> surgical system console. The surgeon wore Tobii Pro 2 eye-tracking glasses to record the frequency and duration that he looked to the tablet. An observer documented the reason for and the communication just prior to the glance. Following the surgery, the surgeon reported his subjective workload using the Surgery Task Load Index (SURG-TLX) and situation awareness with the Situation Awareness Rating Technique (SART).

**Results:** The console surgeon interrupted the procedure and looked outside the console 7–18 times per surgery. Of these, the number of times he used the mounted tablet for information ranged from 1–8 (average=5.1). Reasons for glancing at the video feed were primarily for updates on changing instruments, camera positioning/cleaning, and stapling. The average SURG-TLX scores (out of 20) for the mental workload (14.3), task complexity (13.1), and the degree of difficulty (11.9) were consistent with those reported in the literature for RAS. The average Situation Awareness Rating (out of 7) was 6.

**Conclusions:** The live feed at the foot of the surgeon console supports situation awareness during RAS. Future work should be aimed to measure the entire operating teams workload and situation awareness to improve the operating room communication environment.

## Moderated Poster Session 6: Oncology: Prostate

### MP6-01

#### **Risk of dementia and depression in young men presenting with non-metastatic prostate cancer treated with androgen-deprivation therapy: Data from the TRICARE® military database**

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**Introduction:** Previous studies have found an association between androgen-deprivation therapy (ADT) and an increased risk of dementia and depression in elderly men. That association remains controversial and little is known about the effects of ADT on younger men. We sought to examine the association between the receipt of ADT and these outcomes in young men aged 40–65 years presenting with non-metastatic prostate cancer (PCa).

**Methods:** We identified 9117 men aged 40–65 years diagnosed with localized PCa between 2007 and 2014 without a pre-existing neurocognitive diagnosis using the TRICARE military database. Overall, 325 men received ADT. Kaplan-Meier curves were fitted to compare ADT vs. no ADT. We performed subgroup analysis in patients undergoing ADT for 12 months. Inverse probability of treatment weight-adjusted (IPTW) Cox proportional hazards regression analysis was employed to evaluate the association between ADT and new onset of dementia or depression.

**Results:** Relative to the unexposed cohort, patients receiving ADT had a significantly higher incidence per 1000 person-years of either outcome (depression: 30.9 vs. 16.1; dementia: 19.0 vs. 7.9;  $p=0.003$ ). Time to event analysis showed that event-free survival for both outcomes was significantly shorter in the ADT exposed cohort. This effect was aggravated in a dose-response manner for the subgroup of patients receiving ADT for 12 months. The risk of developing either outcome was higher in the exposed cohort (depression: hazard ratio [HR] 2.09, 95% confidence interval [CI] 1.35–3.23,  $p<0.001$ ; dementia: HR 1.77, 95% CI 1.02–3.06,  $p=0.042$ ).

**Conclusions:** In our cohort of young men with prostate cancer, the receipt of ADT was associated with an increased risk of developing dementia and depression. Long-term use of ADT (12 months) was associated with the highest risk of adverse neurocognitive outcomes.

*This paper has figures, which may be viewed online at: <https://www.eventscribe.com/2019/nsua/SearchByBucket.asp?pfp=Track>*

### MP6-02- WITHDRAWN

### MP6-03

#### **ARCHES: Efficacy of androgen-deprivation therapy with enzalutamide or placebo in metastatic hormone-sensitive prostate cancer by disease characteristics**

R. Szmulewitz<sup>1</sup>, A. Stenzl<sup>2</sup>, D. Petrylak<sup>3</sup>, J. Holzbeierlein<sup>4</sup>, A. Villers<sup>5</sup>, A. Azad<sup>6</sup>, A. Alcaraz<sup>7</sup>, B. Alekseev<sup>8</sup>, T. Iguchi<sup>9</sup>, N. Shore<sup>10</sup>, B. Rosbrook<sup>11</sup>, B. Baron<sup>12</sup>, F. Kuneida<sup>12</sup>, A. Armstrong<sup>13</sup>

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<sup>7</sup>Hospital Clinic de Barcelona; <sup>8</sup>Moscow Cancer Research Institute; <sup>9</sup>Osaka City University Graduate School of Medicine; <sup>10</sup>Carolina Urologic Research Center; <sup>11</sup>Pfizer Inc.; <sup>12</sup>Astellas Pharma, Inc.; <sup>13</sup>Duke Cancer Institute Center for Prostate and Urologic Cancers

**Introduction:** Enzalutamide (ENZA), a potent androgen receptor inhibitor, has demonstrated benefit in men with metastatic and non-metastatic castration-resistant prostate cancer (CRPC). Additional trials were designed to explore the clinical benefits of ENZA plus androgen-deprivation therapy (ADT) in men with metastatic hormone-sensitive prostate cancer (mHSPC).

**Methods:** In ARCHES, a global, double-blind, placebo-controlled, phase 3 study (NCT02677896), patients with mHSPC were randomized 1:1 to ENZA (160 mg/day) + ADT or placebo (PBO) + ADT and stratified by volume of disease and prior docetaxel therapy. The primary endpoint was radiographic progression-free survival (rPFS; scans assessed centrally) or death within 24 weeks of treatment discontinuation. rPFS was further analyzed for pre-specified subgroups, including volume of disease at baseline (high or low) and Gleason score at initial diagnosis ( $\leq 8$  or  $> 8$ ). High-volume disease was defined per CHARTED criteria (Table 1). Treatment continued until disease progression or unacceptable toxicity.

**Results:** A total of 1150 men were randomized in total (ENZA + ADT,  $n = 574$ ; PBO + ADT,  $n = 576$ ). Baseline characteristics were balanced between groups: 63% had high-volume disease, 18% had prior docetaxel, and 66% had a Gleason score of 8. Median followup was 14.4 months. ENZA + ADT significantly improved rPFS ( $p<0.0001$ ), with similar significant improvements reported in subgroups of pts with low- or high-volume disease or with a Gleason score of  $\leq 8$  or  $> 8$  (Table 1). Grade 3–4 adverse events (AEs) were reported in 23.6% of ENZA patients vs. 24.7% of PBO patients with no unexpected AEs. Efficacy outcome (rPFS) by patients' geographic region and by prior local therapy, as well as the time of the initial diagnosis of mHSPC to study enrollment, will be disclosed at the time of presentation.

**Conclusions:** ENZA + ADT significantly improved rPFS vs PBO + ADT regardless of disease volume or Gleason score, indicating a clinical benefit in men with mHSPC with low- or high-volume disease. Preliminary safety analysis appears consistent with the safety profile of ENZA in previous CRPC trials.

*This paper has figures, which may be viewed online at: <https://www.eventscribe.com/2019/nsua/SearchByBucket.asp?pfp=Track>*

### MP6-04

#### **Multidisciplinary approach to increasing primary care clinic prostate cancer screening rates in at-risk and underserved populations**

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University at Buffalo

**Introduction:** Prostate cancer screening algorithms, such as those recommended by the AUA, have been shown to prevent approximately 1.3 deaths from localized and three deaths of metastatic prostate cancer per 1000 men screened. Approximately 33% of men aged 50 or older receive routine prostate cancer screening with at least a prostate-specific antigen (PSA) level. The purpose of this study is to assess our county hospital's PSA screening rate, which serves a majority underserved patient population. Herein, we also describe novel methods to attempt to increase primary care clinic prostate cancer screening rates in this biologically and socioeconomic at-risk population.

**Methods:** From March 2017 until March 2019, patient characteristics were gathered for all men aged 55–69 years old seen at the Erie County Medical Center primary care clinics. In this group, we looked to see if a PSA test was ordered or if a diagnosis of prostate cancer was carried. After an initial screening rate and prevalence of prostate cancer were calculated, attendings and residents in the department of urology made formal didactic presentations in the departments of family medicine and internal medicine. AUA screening algorithms were also posted in these primary care clinics. Moreover, an outpatient clinic was identified and its physicians were interviewed with respect to their prostate screening habits. Repeat patient metrics are then to be collected at three-, six-, and 12-month intervals after the intervention. Further screening strategies, including implementation of



community outreach programs and a full-time prostate cancer liaison, are being undertaken and screening effectiveness will be evaluated.

**Results:** Over the two-year period, a total of 2637 patients were identified in the initial search. Thirty-nine patients were excluded from the study, as they already had a diagnosis or variant of malignant neoplasm of the prostate; 2596 were included in the final analysis. Overall, 20.2% of these men were screened for prostate cancer using a PSA test. Among African Americans, 20.8% received a PSA test compared to 19.5% of non-African Americans ( $p=0.41$ ). In our cohort, the prevalence of prostate cancer was 1.5%.

**Conclusions:** In this single institution, county hospital setting, screening for prostate cancer in primary care clinics is markedly lower than previously reported national averages. There was no racial predilection to PSA screening. Discussion and formal education between urologists and primary care physicians shows promise to increase prostate cancer screening in an at-risk population.

## MP6-05

### Genomic Prostate Score® testing reveals broad heterogeneity of risk among NCCN® favorable-intermediate-risk patients

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**Introduction:** Recently-updated National Comprehensive Cancer Network® (NCCN) prostate cancer guidelines include a subclassification of intermediate-risk (IR), termed favorable-intermediate-risk (FIR), for whom active surveillance may be considered. FIR patients are distinguished from low-risk (LR) patients by the presence of one of three IR features: presence of Gleason score (GS) 3+4 disease, clinical stage T2b/c, or prostate-specific antigen (PSA) 10–20 ng/ml. This group is thus heterogeneous, and whether all IR features bear equivalently on patient risk is unclear. We looked at the probability of having adverse pathology as measured by the Oncotype DX Genomic Prostate Score® (GPS) test in a large cohort of FIR patients who submitted biopsies for commercial laboratory testing.

**Methods:** Commercial reports for >4900 NCCN FIR patients tested with the GPS assay between 5/15/2017 and 5/28/2018 were reviewed for GPS result and post-test risk categorization. Methods for score generation and risk group definitions have been described elsewhere.

**Results:** GPS result spanned the full range (0–100), with median score of 27. Seventeen and 16% of patients results placed them in high-risk (HR) and LR, respectively. GS 3+3 patients had 9% HR and 26% LR results; GS 3+4 subset had 20% HR and 13% LR.

**Conclusions:** The wide range of GPS results in this FIR patient subset shows diversity of risk based on tumor biology. Notably, score distributions and resulting risk classification for patients with GS 3+3 and 3+4 disease differ. GPS testing identifies FIR patients whose risk more resembles that of LR or HR patients, aiding treatment decisions in this heterogeneous group.

## MP6-06

### Management trends and survival in T1c prostate cancer among men >74 years of age

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SUNY Upstate Medical University

**Introduction:** Elderly men are underrepresented in prostate cancer (PCa) literature and management is based on individualized care pathways. In localized disease, reports have shown a survival benefit with surgery and radiation (XRT) among men 65–80 years, and XRT and androgen-deprivation therapy (ADT) among men >75 years. The objective of this study was to assess treatment trends and overall survival (OS) among men >74 years of age with T1c PCa.

**Methods:** The National Cancer Database (NCDB) was queried to identify patients with stage cT1c adenocarcinoma PCa >74 years of age between 2004 and 2016. We excluded all individuals with N1, M1, NX, MX dis-

ease, unknown treatment, treatment with both XRT and surgery, surgery other than radical prostatectomy (RP), prostate-specific antigen (PSA) >99ng/ml. We described four treatment cohorts: observation, XRT, surgery, and ADT alone. We compared demographic factors (age, race, insurance status, income, Charlson comorbidity index [CCI]) and clinical factors (PSA, Gleasons score [GS], treatment setting, distance traveled for care) with Chi-square and ANOVA. We generated Kaplan-Meier survival curves and performed Cox proportional hazards modeling. We generated trend charts to describe management patterns over time.

**Results:** Among 71 542 cases identified, 7% had surgery, 68% had XRT, 7% had ADT, and 18% were observed. We found a decrease in total diagnosed cases and total number treated over time. A decline in XRT was noted, with increases in RP and ADT. Significant differences among men undergoing surgery were noted for younger age, more white, lower PSA, income >\$63K, travel further for care, more treatment at Academic centers, and less combination ADT (all  $p<0.001$ ). Significant differences in OS were noted (log rank $<0.001$ ). Cox regression revealed significant survival benefit for XRT and ADT (hazard ratio [HR] 0.67 and 0.74,  $p<0.001$ , respectively); RP was not significantly associated with OS.

**Conclusions:** Fewer men >74 years with T1c PCa are being diagnosed and treated, yet there has been a rise in the number of RPs performed. Survival benefit was seen for XRT and ADT among this age-based cohort of men. This discrepancy highlights the importance for prospective investigations and suggests a need for more guidance among this population. This paper has figures, which may be viewed online at: <https://www.eventscribe.com/2019/nsaua/SearchByBucket.asp?pf=Track>

## MP6-07

### Long-term oncologic outcomes after limited pelvic lymph node dissection for intermediate- and high-risk prostate cancer

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**Introduction:** The role of pelvic lymph node dissection (PLND) during robot-assisted radical prostatectomy (RARP) for pathological staging and prognosis is clear but its extent and oncologic benefits remain uncertain. We investigated the long-term oncologic outcomes of patients who underwent a limited PLND at RARP for intermediate- (IR) or high-risk (HR) disease based on the National Comprehensive Cancer Network (NCCN) guidelines classification.

**Methods:** We conducted a retrospective review of a prospectively populated and updated database of patients who underwent RARP and limited PLND at Roswell Park Comprehensive Cancer Center between 2005 and 2014. Pearson Chi-square and Wilcoxon rank sum tests were used, and the Kaplan-Meier method was used to define disease-specific survival (DSS) and biochemical recurrence-free survival (BFS).

**Results:** Three hundred forty-five patients were identified with a mean age of  $60\pm 7$  years and a median (interquartile range [IQR]) followup of 60 (30, 90) months; 196 (57%) were IR and 149 (43%) patients were HR. Three percent received neoadjuvant androgen-deprivation therapy. One hundred forty-two (41%) patients were pT2 and 203 (59%) were pT3. The median (IQR) lymph node yield was 7 (4, 10), positive lymph disease was 5%, and surgical soft tissue margins were 31% (Table 1). DSS and BFS were 98% and 87% at five years, respectively (Fig. 1).

**Conclusions:** Limited PLND in NCCN IR or HR prostate cancer patients shows comparable oncologic outcomes to reported outcomes of extended lymph node dissection.

This paper has figures, which may be viewed online at: <https://www.eventscribe.com/2019/nsaua/SearchByBucket.asp?pf=Track>

**MP6-08****Early prostate cancer detection after a previous negative biopsy: MRI, biomarker, or systematic biopsy? A cost-effectiveness analysis**

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**Introduction:** Although recent evidence supports the utility of magnetic resonance imaging (MRI) and biomarker testing to risk-stratify individuals prior to repeat biopsy, choosing wisely is necessary in a resource-limited setting. MRI and biomarker testing are expensive and not available in all jurisdictions. To date, no decision analyses have evaluated the clinical and cost effectiveness of incorporating MRI and biomarker testing after negative prostatic biopsy to facilitate early prostate cancer (PCa) detection.

**Methods:** A two-dimensional Markov microsimulation model (Fig. 1) was constructed to incorporate patient level characteristics known to be clinically important in PCa (age, comorbidity, prostate-specific antigen [PSA], digital rectal exam [DRE], and family history). Following comprehensive literature review, patient covariates were drawn from representative distributions of large population datasets, and test performance was calibrated to available randomized controlled trial data outcomes if not directly reported by the trials. After index intervention, patients were followed in quarterly surveillance where they could re-present, progress, or die from competing risk mortality. The primary outcome was clinically significant PCa detection and total cost. Other outcomes included time to diagnosis, clinically insignificant cases (over-diagnosis), biopsies avoided, complications, PCa progression, and competing risk mortality.

**Results:** Across five years, MRI improved the detection of clinically significant PCa over routine biopsy (31.68% vs. 26.25%; +5.43% absolute improvement), but at higher cost (\$2379.44 vs. \$2238.48; +\$140.96 per patient). This yielded an ICER of \$2595.95 per clinically significant cancer detected. PHI and PCA3 testing yield lower detection rates (20.80% and 23.31%, respectively) at lower cost (\$2156.01 and \$2108.81). In secondary outcome analyses, the majority of cancers were detected earlier in the MRI arm (6.96 months decreased time to diagnosis) with a modest decrease in PCa progression (-0.69%); 35.9% of index biopsies were spared, including -0.87% biopsy-related complications. These results were maintained across a 10-year horizon and varying intervention thresholds.

**Conclusions:** MRI improved the absolute detection of clinically significant PCa and was associated with an ICER of \$2595.95 per clinically significant cancer detected and a seven-month earlier detection benefit. *This paper has figures, which may be viewed online at: <https://www.eventscribe.com/2019/nsaua/SearchByBucket.asp?pf=Track>*

**MP6-09****Undertreatment of prostate cancer in rural residents of Pennsylvania**

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**Introduction:** Rural populations rank poorly on numerous health indicators, including cancer outcomes, when compared to urban populations. We examined the relationship of rural residence with stage and treatment among patients with prostate cancer, the second most common malignancy in men.

**Methods:** Using the Pennsylvania Cancer Registry, we identified all individuals diagnosed with prostate cancer between 2009 and 2015. Patients were classified as residing in rural, large town, or urban areas using the Rural-Urban Commuting Area classification. Our primary outcomes included indicators of prostate cancer treatment and treatment types; we also examined stage and mortality. We used Chi-square tests to assess differences between groups and estimated multivariable logistic regression models to assess the association between rural residence and treatment.

**Results:** We identified 51 024 men diagnosed with prostate cancer between 2009 and 2015. The overall incidence of prostate cancer decreased over the study period from 416 to 304 per 100 000 men, while incidence of metastatic disease increased from 336 to 538 per 100 000. Rural residents were less likely to undergo treatment compared to urban residents, even when stratified by low- (adjusted odds ratio [aOR] 0.77; 95% confidence interval [CI] 0.64–0.91), intermediate- (aOR 0.70; CI 0.58–0.85), and high-

risk disease (aOR 0.66; CI 0.49–0.89). Rural status did not affect receipt of radiation therapy compared to other treatment types.

**Conclusions:** Rural residents are less likely to receive prostate cancer treatment even when stratified by disease risk in Pennsylvania. These results underscore the need for an increase in health care resources in these communities.

*This paper has figures, which may be viewed online at: <https://www.eventscribe.com/2019/nsaua/SearchByBucket.asp?pf=Track>*

**MP6-10****Rate of urinary tract infection in post-prostatectomy catheter removal in the era of antibiotic stewardship**

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University of Pittsburgh School of Medicine

**Introduction:** Antibiotic resistance is a major public health concern and providers should limit antibiotic duration when possible. AUA guidelines recommend a single dose of antibiotic prophylaxis recommended for high-risk patients undergoing catheter removal. We aim to examine antibiotic practices for post-prostatectomy catheter removal at our institution.

**Methods:** We retrospectively examined 157 patients who underwent open and robotic radical prostatectomy by eight surgeons from August 2018 through January 2019. We reviewed discharge antibiotics, doses, and durations for each prostatectomy patient. Patients were discharged on one of four antibiotic prophylaxis regimens depending on the surgeon (no antibiotics, one dose of 500 mg ciprofloxacin, five days of 500 mg twice daily (bid) ciprofloxacin, or 21 days of bid bactrim). Charts were reviewed for the 30 days following catheter removal in the office. Urinary tract infections (UTIs) were defined as symptomatic UTIs or culture-positive UTIs.

**Results:** Of the 157 post-prostatectomy patients examined, 28 did not receive any antibiotics, 84 received one dose of 500 mg ciprofloxacin, 31 received five days of 500 mg bid ciprofloxacin, and 14 received 21 days of dactrim. Six of 28 in the group without antibiotics had a symptomatic and culture-positive UTI within 30 days (21%). Five of 84 in the single-dose group were noted to have a symptomatic UTI within 30 days (5.9%), and three out of 84 were noted to have a culture-positive UTI within 30 days (3.6%). There were no 30-day UTIs in the groups of patients who received five- and 21-day courses. On logistic regression analysis, a patient that did not receive antibiotics was 4.3 times more likely to have a UTI to patients receiving a single dose ( $p=0.025$ ).

**Conclusions:** There is a significantly higher rate of UTI in patients who did not receive any antibiotic prophylaxis for catheter removal. We hope to encourage a department-wide standardized approach to post-prostatectomy catheter removal antibiotic prophylaxis in the future.

*This paper has figures, which may be viewed online at: <https://www.eventscribe.com/2019/nsaua/SearchByBucket.asp?pf=Track>*

**MP6-11****Patient-reported pain outcomes following opioid-sparing prostatectomy and nephrectomy**

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University of Pittsburgh Medical Center

**Introduction:** There has been an initiative in our department to reduce opioid prescribing. To assess the effect this reduction in opioid prescribing has had on patient-reported pain outcomes, we compared survey results of patients who received opioid prescriptions with those of patients who did not following prostatectomy or nephrectomy.

**Methods:** In a single-center, prospective, cross-sectional study, the American Pain Society Patient Outcome Questionnaire (APS-POQ) was distributed to patients following open and robotic-assisted prostatectomy and nephrectomy surgeries between January and April 2019. Patient demographic information, postoperative pain prescriptions, hospital course, and surgeon characteristics were collected from the electronic medical record, matched with questionnaire data and de-identified. Comparisons were made between patients receiving opioid and non-opioid postoperative pain management with Wilcoxon rank-sum tests. Alternative pain relief methods between groups were compared with Chi-squared.

**Results:** A total of 62 patients completed the APS-POQ following prostatectomy ( $n=41$ ) or nephrectomy ( $n=21$ ). Patients who did not receive

an opioid prescription following surgery had no significant differences in measured outcomes compared to patients who were prescribed opioids. Amount of pain experienced, time in pain, and effect of pain on recovery and mood were all statistically similar between groups (Table 1). Most (91%) prostatectomy patients who did not receive an opioid prescription were satisfied with their pain treatment, while 89% prescribed opioids reported satisfaction ( $p=0.65$ ); 78% of opioid-free nephrectomy patients were satisfied with their pain treatment, while 92% of patients prescribed opioids reported satisfaction ( $p=0.39$ ). The median duration of hospitalization was significantly lower for patients that did not receive any opioids compared to patients receiving opioids (one day, interquartile range [IQR] 1–2 vs. two days, IQR 2–3;  $p<0.001$ ).

**Conclusions:** Most patients undergoing prostatectomy or nephrectomy operations can manage their postoperative pain without opioid analgesia. Patient satisfaction with opioid-free pain management is similar to those whom opioids were provided. These results should support adoption of opioid-free prostatectomies and nephrectomies for most patients. *This paper has figures, which may be viewed online at: <https://www.eventscribe.com/2019/nsaua/SearchByBucket.asp?pfp=Track>*

## MP6-12

### Positive surgical margin rate in sequential prostatectomy: A single-center experience

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**Introduction:** Research has shown concern for surgeon fatigue when operating, as mental and physical exhaustion can ensue when performing consecutive surgeries. Few studies have been dedicated to examining sequential robotic prostatectomy on patient outcomes. This study aims to assess possible surgeon fatigue on oncologic outcomes, with the concern that the second case of the day might experience a higher rate of positive surgical margins compared to the first.

**Methods:** The surgical scheduling calendar at our institution was reviewed from January 1, 2015 to July 1, 2018 to identify all sequential prostatectomy cases. The data from our institution represent the experience of one of 10 centers participating in a study spearheaded by the Case Western Reserve Urology Department. Chi-square analyses and Fishers exact tests were performed for categorical variables and student t-tests were used for continuous variables using SPSS statistical software.

**Results:** During the study period, 92 sequential prostatectomies were retrospectively reviewed, permitting comparison of 46 second surgeries to the first case of the day. There were no significant differences in baseline patient characteristics including age, body mass index, prostate-specific antigen (PSA), or biopsy Gleason score. Intraoperative factors, such as blood loss, prostate specimen volume, and total lymph nodes removed did not differ between groups. The first case of the day trended toward a longer duration (226 vs. 210 minutes;  $p=0.08$ ). Histopathologic factors, such as % tumor involvement, final Gleason score, and AJCC T-stage were comparable between groups. The rates of positive margin status, seminal vesical invasion, and lymph node positivity did not differ between the first and second case of the day. The rate of extraprostatic extension was significantly higher in the second case of the day (35% vs. 13%;  $p=0.01$ ), though this did not impact margin status.

**Conclusions:** Performance of sequential prostatectomy at our institution did not result in a higher positive margin rate. There was no increase in operative time and no increase in blood loss, and comparable numbers of lymph nodes were removed. The results indicate that oncologic outcomes and safety are not sacrificed in performing consecutive robotic surgeries in the same day.

## MP6-13

### Streamlining costs of robot-assisted radical prostatectomy: Can we optimize the financial burden?

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**Introduction:** The robot-assisted approach to radical prostatectomy (RARP) has gained worldwide acceptance and has become a continuously emergent standard procedure. It is estimated >85% of radical prostatectomies are performed with robotic assistance. However, the financial burden of robotic surgeries to health administrations and patients is known to be higher than the traditional approaches, such as laparoscopic and open procedures. The average cost of RARPs in the U.S. is approximately \$14 000, compared to \$8600 for open radical prostatectomy, according to one study comparing prices at hospitals across the U.S. (Tomaszewski, 2012). We sought to identify drivers of cost at our institution and implement changes that could reduce the financial burden associated with RARPs.

**Methods:** A retrospective review of annual cost data of all RARPs performed by four experienced robotic surgeons during the last fiscal year was performed at our site (2017–2018). Significant drivers of cost were identified (>10% variability among all surgeons). After educating the surgical team, a pilot process, instituting a series of changes, was evaluated with the most economical surgeon. Implemented changes included reducing six robotic instruments to four, switching from a V-Lock to a standard suture, and the incorporation of non-robotic reusable trocars (Table 1). Our team subsequently compared the impact these changes had on costs (two-sample t-test).

**Results:** A total of 106 procedures were reviewed and compared. Significant variability in the cost associated with the procedure was observed. Supplies were identified as the chief driver of operative costs (44%), followed by console time (22%). Evaluation of the pilot process revealed 11 procedures before the changes were made compared to nine procedures after the changes were implemented for this fiscal year (Table 2). A decrease in console time by 30 minutes was observed. There was also a statistically significant decrease in medical supply costs ( $p=0.0016$ ).

**Conclusions:** Open discussion of costs related to operating room expenses will initiate the process to reduce the financial burden associated with RARPs. This process has the potential to be economically instrumental for healthcare facilities across the U.S. that perform RARP. Further analysis of this process will aid in applicability to other large healthcare facilities. *This paper has figures, which may be viewed online at: <https://www.eventscribe.com/2019/nsaua/SearchByBucket.asp?pfp=Track>*

## MP6-14

### Use of prostate-specific membrane antigen and galectin-3 expression as novel primary tumor markers for diagnostic purposes in metastatic prostate cancer

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SUNY Buffalo

**Introduction:** Treatment of metastatic prostate cancer (PCa) remains challenging at this time. Galectins (Gals) and prostate-specific membrane antigen (PSMA) have been functionally implicated in growth of PCa. PSMA is a glycoprotein residing in the cytoplasm of normal prostate cells, however, through the splicing defects seen in PCa, it relocates to the surface membrane, allowing it, along with Gals, to be used as potential targets. This study aims to establish a correlation between the expression of these transmembrane glycoproteins and metastatic potential in PCa for future exploitation in both diagnostics and therapeutics.

**Methods:** Immunohistochemical staining for PSMA, Gal-1, and Gal-3 was performed on sections of 30 prostate biopsy specimens; 20 positive for known metastatic PCa and 10 negative controls. Immunoreactivity was scored for fluorescent intensity using ImageJ analysis and results were correlated with Gleason score. Independently, expression levels of PSMA, Gal-3, and Gal-1 in three different immortalized PCa cell lines of known metastatic potential were quantified.

**Results:** On an average, metastatic PCa cells expressed an approximately 23-fold increase in levels of PSMA (~14–67-fold range) and an approxi-



mately nine-fold increase in Gal-3 (~3.1–32-fold range) compared to negative controls (232.55 pixel units [pu] vs. 11.06 pu [PSMA], 58.33 pu vs. 3.43 pu [Gal-3]). Gal-1 showed a approximately 1.5-fold increase. Among the PCa samples, PSMA and Gal-3 expression positively correlated with Gleason score ( $p < 0.0001$ ). In the PCa cell lines used, LNPCa demonstrated an increased expression of both PSMA and Gal-3, while PC-3 only showed overexpression of Gal-3. With regards to Gal-3 expression there was a approximately 3.6-fold increase in expression in PC-3 cells when compared to LNPCa and LNPCa KD cells.

**Conclusions:** This study establishes that overexpression of Gal-3 and PSMA correlates with other traditional adverse prognostic factors and independently predicts high-grade tumors in primary metastatic PCa. The overexpression of these membrane glycoproteins can be used to evaluate both metastatic potential, as well as for therapeutic purposes as a selective target on PCa cells. Additionally, PC-3 cell lines did not show overexpression of PSMA, whereas all 20 metastatic PCa samples demonstrated between approximately 14–67-fold increase. Thus, PC-3, a commonly used investigational cell line, may require further investigation into the causality of its aggressive nature.

### MP6-15

#### Vitro use of combined targeting of prostate-specific membrane antigen and galectin-3 for therapeutic advantage in management of prostate cancer

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**Introduction:** It has been shown that galectin-3 (Gal-3) and prostate-specific membrane antigen (PSMA) are over-expressed in prostate cancer (PCa) cells and play a functional role in their proliferation and metastatic potential. PSMA is a transmembrane protein that shifts from the intracellular to the extracellular surface secondary to PCa mutations, allowing it, along with Gal-3, to be a potential target for both diagnosis and management of metastatic PCa. 2-PMPA (PSMA inhibitor) and Ac-SDKP (Gal-3 inhibitor) have shown effectiveness in inhibiting their respected targets, however, the usefulness of their application conjointly in the setting of enzalutamide remains to be seen. We worked towards establishing the efficacy of 2-PMPA, Ac-SDKP, and enzalutamide alone or in combination in order to establish if using PSMA and Gal-3 as targets could provide therapeutic advantage.

**Methods:** Using two different androgen-responsive PCa cell lines, LNPCa and LNPCa KD (PSMA knockdown) and one castration-resistant cell line, PC-3(PSMA<sup>-</sup>), the effects of 2-PMPA, Ac SDKP, and enzalutamide either alone or in combination were analyzed for cell viability using the standard MTT assay. Comparative analysis was performed to identify the effectiveness of each treatment alone and in combination to determine therapeutic application.

**Results:** Enzalutamide exposure alone showed comparable, significant inhibition in LNPCa and LNPCa KD at all doses, with approximately 80% cell death at the highest dose ( $p < 0.0001$ ), but was ineffective in PC-3 cells at all doses tested. Treatment with 2-PMPA only showed significant therapeutic effect in LNPCa cells at 10, 100, and 200 nM (23%, 35%, 52%, respectively;  $p < 0.001$ ). Ac-SDKP showed significant comparable therapeutic effects, showing approximately 64% cell death at the highest

dose ( $p < 0.001$ ) in all three cell lines. Combination treatment in LNPCa and LNPCa KD cell lines showed strong and equivalent suppression (~94%;  $p < 0.001$ ), while combination treatment in the PC-3 cell line did not show significant advantage over Ac-SDKP alone.

**Conclusions:** The addition of 2-PMPA and Ac-SDKP to enzalutamide enhances in vitro inhibition of the proliferation in PSMA expressing PCa cells compared to using each individually. In the castration-resistant and PSMA-lacking PC-3 cell line, Ac-SDKP is moderately effective, warranting further investigation into the dose required for optimal results.

### MP6-16

#### Validation of a full-immersion simulation platform for robot-assisted radical prostatectomy using three-dimensional printing and hydrogel molding technology

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**Introduction:** Simulation is an important tool for training outside of the operating room. Virtual reality systems are the primary platform for robotic skills training but lack physical interface with tissue. Animal and cadaver models are associated with high procurement and upkeep costs. This study represents validation of a high-fidelity, inanimate robot-assisted radical prostatectomy (RARP) model within a full-immersion simulation environment.

**Methods:** Anatomically accurate models of the human pelvis, bladder, prostate, seminal vesicles, urethra, neurovascular bundle, and relevant adjacent structures were created from a patient's magnetic resonance imaging (MRI) using polyvinyl alcohol hydrogels and three-dimensional-printed injection molds. Pertinent steps of the nerve-sparing RARP were simulated: bladder neck dissection, seminal vesicle mobilization, nerve-sparing prostatectomy, and urethrovesical anastomosis (UVA). Five experts (>250 cases) and nine novices (<50 cases) completed the simulation. Face and content validity were calculated using expert model ratings for realism, similarity of the model to cadaveric models, and usefulness as a training tool. Differences in performance among groups with various levels of experience using the clinically relevant performance metrics were used to calculate construct validity.

**Results:** Expert performance was superior to novices in operative time, margin status, and UVA leak rates. Differences in estimated blood loss were not statistically significant. Eighty percent of experts found the bladder neck dissection, nerve-sparing, UVA, and apical dissection to be the most realistic. More than 80% of experts found the model to be superior to cadavers in its bleeding capability, ability to replicate all steps of the procedure, and anatomical resemblance to live surgery. Sixty percent of experts found the tissue texture to be superior to cadaveric tissue and 40% found it similar. All experts agreed that the model is suitable as a training tool and a mandatory prerequisite in assessing trainees prior to live surgical training.

**Conclusions:** An inanimate, full-task hydrogel model was highly rated for realism and suitable as a training tool for RARP. Construct validity between experts and novices was demonstrated using clinically relevant performance metrics. This full-immersion simulation platform provides a comprehensive tool for surgical skill development and evaluation.