

## Graduating resident and fellow readiness for general urologic practice during the COVID-19 pandemic

### A survey-based assessment of trainees and program directors

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## ABSTRACT

**INTRODUCTION:** Our goal was to compare the perceived readiness of graduating urologic residents and fellows to program directors (PDs) in U.S.-based postgraduate training programs. Additionally, we set out to assess the impact of COVID-19 on postgraduation plans to pursue fellowship training.

**METHODS:** Graduating residents, fellows, and PDs of accredited residency/fellowship programs in the U.S. were surveyed. The ranked preparedness of trainees to perform common urologic procedures was measured using a Likert scale from 1 (not comfortable) to 5 (fully proficient). The impact of COVID-19 was measured using a three-point Likert scale. Chi-squared and Kruskal-Wallis analyses were used to compare the groups.

**RESULTS:** From 93 responders, 21 were residents, 19 were fellows, 24 were residency PDs, and 29 were fellowship PDs. The median levels of comfort for trans-urethral resection of the prostate, hydrocelectomy, vasectomy, and urethral sling were at or above ( $\geq 3$ ) moderate for both PDs and trainees. PDs were more likely to report underperformance for hypospadias repair (60% vs. 39%), penile prosthesis implantation (39% vs. 26%), and orthotopic neobladder formation (57% vs. 18%) than the trainees. Fifty-three (57.0%) of the surveyors felt that COVID-19 did not impact the trainees' comfort in performing general urologic procedures. COVID-19 influenced trainees' decision to pursue a fellowship or opt to practice as general urologists ( $p=0.002$ ).

**CONCLUSIONS:** Our study suggests there may be a self-reported discrepancy between graduating trainees and their PDs regarding trainees' comfort levels performing general urologic procedures.

## INTRODUCTION

Current data suggests that graduating urology residents may need more readiness to perform many urologic procedures independently.<sup>1</sup> These findings are even more concerning considering the expected decrease in the overall number of practicing urologists and the aging patient population requiring increasing urologic care.<sup>2</sup> Currently, over half of practicing urologists in the U.S are over 55 years old, including almost one-third who are over 65 years old.<sup>3</sup> McKibben et al further projects a 46% deficit in urologists by 2035 if the current demand for urologic services remains constant.<sup>4</sup>

To further exacerbate the provider-patient discrepancy, reports from the 2023 fellowship match indicated 134 applicants matched into 167 fellowship vacancies. This gap will further lead to subspecialty underrepresentation.<sup>5</sup> Additionally, there are 365 urology residency positions for 144 urology residency programs as of 2022, which will continue to fill the vacant provider positions for years to come but fail to meet the rate of physician retirement.<sup>6</sup>

Aside from the widening provider-patient access gap, faculty and residents have also reported a discrepancy between surgical skills deemed necessary in the field and perceptions of self-proficiency. In contemporary post-graduate training, inconsistency remains between urology trainees and their program directors in the perceived availability

## KEY MESSAGES

- A discrepancy exists between trainee self-evaluation and program directors' confidence assessments regarding the performance of certain urologic procedures.
- A lack of comfort among graduating trainees is concerning, considering the current aging population of urologists.
- Lack of hands-on experience may be contributing to a lack of comfort operating independently.
- Interventions, such as increasing frequency of in-person feedback, simulation labs, and cadaveric models, may help address some of these limitations.

of educational resources, including advanced skills training models and subspecialty exposure. Similarly, there continues to be an incongruity between these parties regarding the anticipated and reported working hours of urology residents.<sup>7</sup>

A significant decrease in clinical and surgical experience during COVID-19 may have exacerbated differences between perceived trainee readiness amongst urology trainees and program directors (PDs). The COVID-19 pandemic placed potentially problematic limitations on educational exposure in clinics, the operating room, and opportunities provided through urological conferences. These disruptions to clinical education required changes in the format in which educational materials were presented, prioritizing virtual learning and video-based teaching to replace the previous paradigm of trainee education, but leaving a void in terms of operative experiences that should have been included.<sup>8</sup>

For these reasons, we set out to perform a retrospective cohort analysis of graduating urology residents and fellows to identify whether a discrepancy exists between PDs' perceptions and the self-perceived readiness of graduating urology trainees. Additionally, we surveyed graduating trainees to assess the impact of COVID-19 on their readiness to enter urologic practice upon completion of training.

## METHODS

Graduating urology residents and subspecialty fellows, along with the related PDs, participated in a cross-sectional, anonymous survey to determine whether the COVID-19 pandemic had affected the trainees' level of comfort in performing common surgical procedures in urological practice. We additionally queried the trainee responders on their comfort level in performing specific procedures and compared those to the responses we received from the PDs. These procedures were chosen based on guidelines provided by the Accreditation Council for Graduate Medical Education (ACGME). The study protocol was reviewed and approved by the State University of New York (SUNY) at Buffalo Institutional Review Board and was exempt due to the nature of the study.

The authors developed a thirty-question survey and pilot-tested residents from our program to ensure clarity before its distribution. We hosted the survey online using the SurveyMonkey platform. Surveys were distributed to participants through a mass email to the Program Directors'/Coordinators' list server containing a link to the web-based application. Participants received no form of compensation for completing this survey. The survey was open to complete for a period of six months, from January through July 2021.

The survey used in this study comprises a demographics questionnaire followed by a COVID-19-centric questionnaire. The demographics questionnaire first asked participants to categorize their age and gender and rank their level of preparedness to perform common urologic surgical procedures using a Likert scale (1–5, from not comfortable to fully proficient). The questionnaire followed with a series of questions where participants were asked to categorize their answers as strongly disagree, somewhat disagree, neutral, somewhat agree, strongly agree, or prefer not to say to statements involving their feelings towards how the pandemic has shaped their academic and professional careers.

## Statistical analysis and data management

Results and responses were tabulated using the SurveyMonkey software and were then subjected to chi-square tests to determine significance. COVID-19 data was collected using a dichotomous scale (yes or no) and a three-point Likert scale. All analyses were performed using the Statistical Program for Social Sciences version 28.0 on the Mac OS platform (SPSS-IBM Inc. Chicago, IL). Descriptive analyses of the responses were

performed, and the related frequencies with percentage values were presented. Data were graphed for a better presentation. Comparison between the trainees' and PDs' responses was performed using chi-square with McNemar tests and Kruskal-Wallis analyses between all four groups surveyed. Median values with interquartile range were calculated and presented for the questions that used Likert scale responses. The variables in the demographics portion of the survey underwent a binomial logistic regression of the effects of the pandemic on the quality of training and decreases in the comfort level. A p-value of 0.05 was considered statistically significant.

## RESULTS

### Procedural comfort

Ninety-three people responded to the survey; 21 residents, 19 fellows, 24 residency PDs, and 29 fellowship PDs. A response rate of 16% for all trainees and PDs was noted. The descriptive statistics of the respondents are listed in Table 1. There was no significant difference between PDs' and trainees' distribution in the categories of age, race, and gender; however, there was a difference in their subspecialties and American Urological Association (AUA) sections. Mean Likert scoring for comfort level with surveyed urologic procedures is noted in Figure 1.

Chi-squared analysis between the groups revealed statistically significant differences for trans-urethral resection of the prostate (TURP), hydrocelectomy, vasectomy, urethral sling, penile prosthesis, hypospadias repair, and orthotopic neobladder, as seen in Table 2. Although significant, median comfort for TURP, hydrocelectomy, vasectomy, and urethral sling were at or above the median (Likert=3, moderately comfortable) for all groups. PDs reported above the median for hypospadias repair 27/45 (60%), penile prosthesis 17/44 (39%), and orthotopic neobladder 25/44 (57%) compared to trainees reporting under the median 15/38 (39%), 10/38 (26%), and 7/38 (18%), respectively. 19/24 (79.2%) residency PDs felt residency graduates were below the median Likert score; 11/21 (52.4%) of residents felt they fell below the median. Additionally, 2/29 (6.9%) fellowship directors reported that their trainees were below the median Likert score compared to 10/19 (52.6%) among the fellows.

Application of a Kruskal-Wallis analysis revealed significant differences between pooled PDs (residency and fellowship) and trainees (residents and fellows) in comfort level for their general preparedness enter-

**Table 1. Descriptive statistics of survey respondents**

Descriptive statistics (N=total respondents)	Respondents (n)	p
<b>Age (N=41)</b>		0.585
20-30	4	
30-35	27	
35-40	9	
40-45	1	
<b>Race (N=41)</b>		0.833
White or Caucasian	28	
Black or African American	0	
Hispanic or Latino	4	
Asian or Asian American	5	
Native Hawaiian or other Pacific Islander	0	
Another race	1	
Prefer not to answer	3	
<b>Gender (N=41)</b>		0.194
Male	30	
Female	9	
Non-binary	1	
Prefer not to answer	1	
<b>AUA section (N=95)</b>		0.018
Western	12	
South Central	9	
North Central	21	
Southeastern	12	
Mid-Atlantic	5	
New York	7	
Northeastern	12	
New England	11	
Not affiliated with AUA section	6	
<b>Subspecialty (N=48)</b>		0.023
Female pelvic medicine and reconstruction	3	
Pediatrics	6	
Oncology	11	
Endourology	18	
Infertility	2	
Male reconstruction	6	
Fertility	1	
Voiding dysfunction	1	

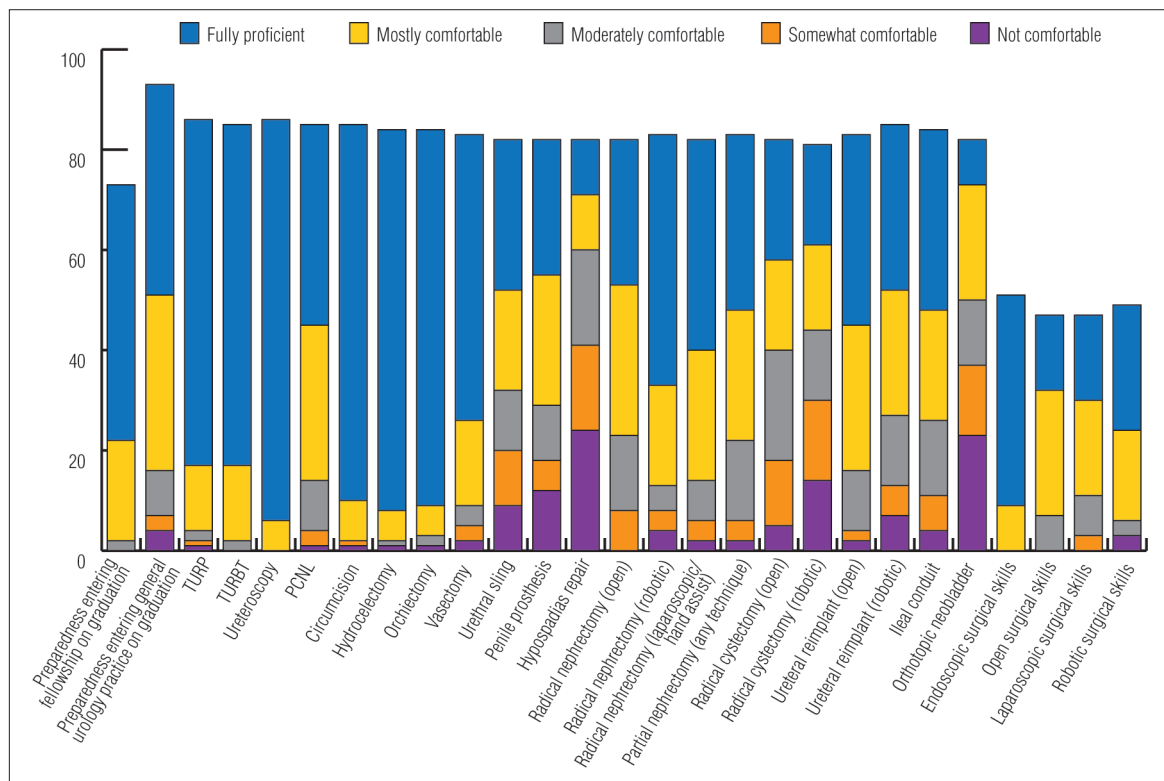


Figure 1. Graphic of perceived comfort levels reported by trainees and program directors

ing fellowship (39.45 vs. 30.03, respectively;  $p=0.037$ ). The discrepancies between the PDs and trainees were more pronounced (47.02 vs. 35.11,  $p=0.02$ ) for hypospadias repair; (47.42 vs. 34.64,  $p=0.013$ ) for open radical cystectomy and (51.55 vs. 29.87,  $p<0.001$ ) for orthotopic neobladder creation procedures.

### COVID-19 impact on training

Most PD and trainee responders felt that COVID-19 did not impact graduating trainees' proficiency in performing general urologic procedures (28.8% vs. 41.5%, respectively), with no statistical significance between groups; however, PDs and trainees differed in their perception of the pandemic's impact on overall comfort level in performing general urologic procedures after graduation (Figure 2). A great majority of PDs (82%) felt that the COVID-19 pandemic did not impact the training program, compared to only 48.8% of trainees ( $p<0.001$ ).

### DISCUSSION

Previous research suggests that senior and recently graduated urology residents in the U.S. have low confidence rates in "independently" performing urologic procedures.<sup>7,9</sup> This lack of procedural confidence is

common to urologic surgery training, as it has also been noted in obstetrics, gynecology, and oral-maxillofacial surgery trainees.<sup>10,11</sup> The ACGME milestones for urology competency are based on a trainee's ability to independently perform various procedures. This interpretation invites bias for evaluating trainees' readiness from institution to institution and presents a need for more consistent and universal measurement of resident readiness for independent practice. This model of competency evaluation may also fail to assess a practitioner's perceived readiness to operate upon entering practice by omitting a standardized assessment of the trainees' confidence in performing a given procedure independently.

Our study's results suggest that residency PDs felt more confident in their trainees' preparedness than resident respondents. Only 20.8% (5/24) of residency PDs rated resident preparedness at or below the median Likert score compared to 47.6% (10/21) of graduating residents. This is consistent with other publications that reported residents underestimate their abilities compared to faculty assessment.<sup>12,13</sup> The reasons for this discrepancy are not well-established and are considered multifactorial. Surgical specialties, however, may

**Table 2. Perceived comfort level of graduating trainees performing urology procedures**

	Fellowship PD: Mean ± SD (n)	Residency PD: Mean ± SD (n)	Fellow: Mean ± SD (n)	Resident: Mean ± SD (n)	Total: Mean ± SD (n)	p
Preparedness entering fellowship on graduation	4.79±0.412 (29)	4.72±0.458 (25)	4.42±0.692 (19)	-	4.67±0.528 (73)	0.097
Preparedness entering general urology practice on graduation	<b>3.31±1.105 (29)</b>	<b>4.79±0.415 (24)</b>	<b>4.32±1.003 (19)</b>	<b>4.48±0.602 (21)</b>	<b>4.16±1.025 (93)</b>	<b>&lt;0.001</b>
TURP	<b>4.31±1.050 (26)</b>	<b>4.95±0.213 (22)</b>	<b>4.83±0.383 (18)</b>	<b>4.90±0.308 (20)</b>	<b>4.72±0.680 (86)</b>	<b>0.003</b>
TURBT	4.58±0.643 (26)	4.90±0.310 (21)	4.78±0.428 (18)	4.90±0.308 (20)	4.78±0.472 (85)	0.087
Ureteroscopy	4.85±0.368 (26)	5.00±0.000 (22)	4.89±0.323 (18)	5.00±0.000 (20)	4.93±0.256 (86)	0.094
PCNL	4.08±1.055 (26)	4.52±0.512 (21)	4.11±1.132 (18)	4.30±0.657 (20)	4.25±0.885 (85)	0.599
Circumcision	4.62±0.898 (26)	5.00±0.000 (21)	4.83±0.383 (18)	4.95±0.224 (20)	4.84±0.553 (85)	0.061
Hydrocelectomy	4.60±0.913 (25)	4.95±0.218 (21)	4.94±0.236 (18)	5.00±0.000 (20)	4.86±0.541 (84)	0.027
Orchiectomy	4.60±0.913 (25)	5.00±0.000 (21)	4.83±0.514 (18)	4.95±0.224 (20)	4.83±0.577 (84)	0.051
Vasectomy	<b>4.00±1.251 (24)</b>	<b>4.71±0.561 (21)</b>	<b>4.56±0.984 (18)</b>	<b>4.80±0.410 (20)</b>	<b>4.49±0.929 (83)</b>	<b>0.024</b>
Urethral sling	<b>2.96±1.581 (23)</b>	<b>4.43±0.676 (21)</b>	<b>2.78±1.353 (18)</b>	<b>4.30±0.865 (20)</b>	<b>3.62±1.385 (82)</b>	<b>&lt;0.001</b>
Penile prosthesis	<b>2.91±1.649 (23)</b>	<b>4.43±0.598 (21)</b>	<b>3.00±1.572 (18)</b>	<b>4.10±0.788 (20)</b>	<b>3.61±1.394 (82)</b>	<b>0.002</b>
Hypospadias repair	<b>2.52±1.442 (23)</b>	<b>3.43±1.248 (21)</b>	<b>2.28±1.364 (18)</b>	<b>2.20±1.281 (20)</b>	<b>2.62±1.402 (82)</b>	<b>0.016</b>
Radical nephrectomy (open)	4.13±0.968 (23)	4.10±0.944 (21)	4.11±0.900 (18)	3.60±1.046 (20)	3.99±0.975 (82)	0.266
Radical nephrectomy (robotic)	4.25±1.189 (24)	4.33±0.856 (21)	4.33±1.414 (18)	4.30±0.979 (20)	4.30±1.101 (83)	0.666
Radical nephrectomy (laparoscopic/hand assist)	4.35±0.832 (23)	4.33±0.796 (21)	4.33±0.970 (18)	3.95±1.317 (20)	4.24±0.988 (82)	0.794
Partial nephrectomy (any technique)	4.24±0.879 (25)	4.10±0.889 (21)	4.17±1.200 (18)	3.68±1.108 (19)	4.06±1.016 (83)	0.261
Radical cystectomy (open)	3.78±1.380 (23)	3.86±1.153 (21)	3.17±0.985 (18)	3.20±1.281 (20)	3.52±1.240 (82)	0.097
Radical cystectomy (robotic)	3.41±1.532 (22)	3.48±1.327 (21)	2.67±1.328 (18)	3.00±1.522 (20)	3.16±1.444 (81)	0.258
Ureteral reimplant (open)	3.87±1.180 (23)	4.36±0.790 (22)	4.44±0.705 (18)	4.15±0.933 (20)	4.19±0.943 (83)	0.337
Ureteral reimplant (robotic)	3.64±1.350 (25)	3.82±1.140 (22)	3.78±1.478 (18)	4.15±1.040 (20)	3.84±1.252 (85)	0.644
Ileal conduit	4.00±1.285 (24)	4.05±1.214 (22)	3.72±1.227 (18)	3.95±0.999 (20)	3.94±1.176 (84)	0.726
Orthotopic neobladder	<b>3.22±1.313 (23)</b>	<b>3.57±1.248 (21)</b>	<b>2.33±1.188 (18)</b>	<b>1.80±1.196 (20)</b>	<b>2.77±1.408 (82)</b>	<b>&lt;0.001</b>
Endoscopic surgical skills	<b>4.67±0.480 (27)</b>	<b>5.00±0.000 (24)</b>	-	-	<b>4.82±0.385 (51)</b>	<b>0.002</b>
Open surgical skills	4.12±0.726 (25)	4.23±0.612 (22)	-	-	4.17±0.670 (47)	0.637
Laparoscopic surgical skills	4.16±0.800 (25)	3.95±0.999 (22)	-	-	4.06±0.895 (47)	0.532
Robotic surgical skills	4.15±1.287 (26)	4.39±0.656 (23)	-	-	4.27±1.036 (49)	0.947

\*Likert scale (1–5) was used to evaluate level of comfort (1=not comfortable, 2=somewhat comfortable, 3=moderately comfortable, 4=mostly comfortable, 5=fully proficient). \*Question regarding endoscopic, open, laparoscopic, and robotic surgical skills evaluation was only posited to program directors

exhibit a self-selecting bias for reported comfort as a reflection of providers and trainees who might judge their procedural performance more harshly than their clinical counterparts.

Alternatively, fellowship PDs felt less confident in their fellows' preparedness to enter the general

urologist workforce than did the fellows. The majority (93.1%) of fellowship PDs reported their trainees to be at or below the median Likert score (three out of five) compared to 47.3% of fellows. The divergence in fellowship and residency PDs' confidence in their mentees' procedural abilities may also reflect a dif-

ference in their expectations at their respective level of training.

Our study highlights the differences between residents and PDs regarding trainees' comfort with the following procedures: TURP, hydrocelectomy, vasectomy, urethral sling, penile prosthesis, hypospadias repair, and orthotopic neobladder. Although significant, all groups had a median comfort level at or above the average (Likert=3, moderately comfortable) for TURP, hydrocelectomy, vasectomy, and urethral sling. The reported median comfort level of somewhat comfortable suggests that the trainee would be comfortable performing the procedure independently and thus recognized as the baseline for confidence performing in practice. The complexity and skill required for hypospadias repair, penile prosthesis, and orthotopic neobladder formation procedure likely contribute to trainees' relatively lower comfort level in performing these procedures. These findings are consistent with reported results from a 2019 cohort analysis which found chief residents were comfortable with simple general urology procedures but reported a notable lack of confidence with advanced and minimally invasive laparoscopic and robotic techniques.<sup>7</sup> Comparatively, approximately 25% of general surgery trainees felt that they would not be confident operating independently at graduation and 40–60% of graduating surgery residents were uncomfortable with more complex procedures in their scope of practice, such as esophagectomies and hepatic lobectomies.<sup>14-16</sup>

In our study, graduating residents exhibited confidence in performing most core urologic surgical procedures; however, residents and their respective PDs agreed that the trainees required more confidence in performing hypospadias repairs and orthotopic neobladder procedures. Nonetheless, the PDs' average confidence was higher than residents, with a Likert score above three. Therein lies a space for innovations in training paradigms to address these exposure gaps in case-specific volume and difficulty through cadaveric models, 3D printing, virtual reality robotic simulations, or animal models.<sup>17-19</sup> Simulations and training programs investigating urologic procedures have proven beneficial for training, including pyeloplasty, prostatectomy, and partial nephrectomy.<sup>20-22</sup> Implementation of similar curricula may improve the competence and confidence of graduating residents. Further advancement in our traditional procedural training paradigm may also be suggested by adopting a concurrent confidence self-assessment at the time of faculty evaluation to aid in bridging the exhibited gap in perceived readiness upon completion of training.

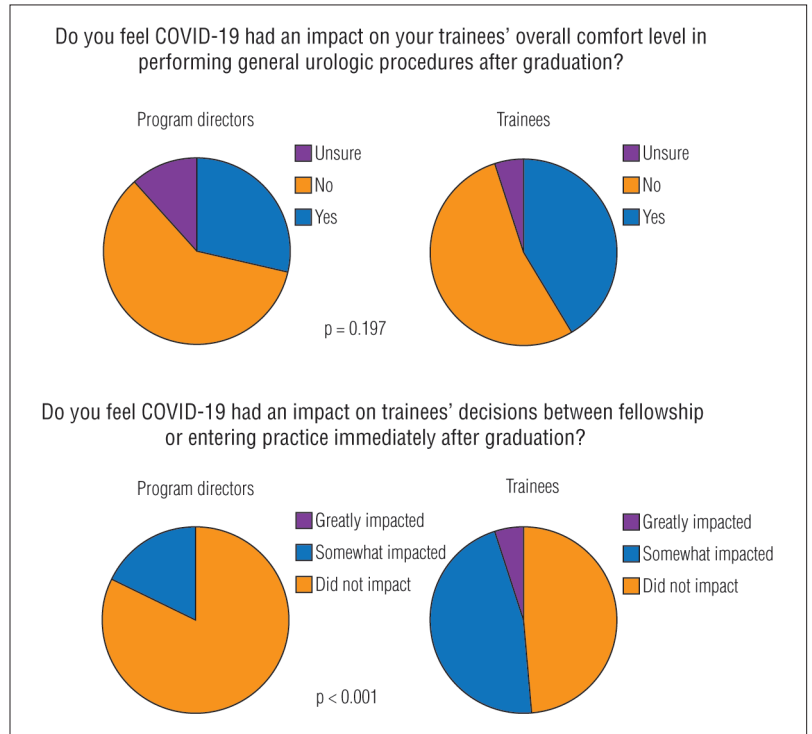


Figure 2. Graphs of COVID-19 impact survey responses.

The advent of electronic mobile application-based evaluation platforms may allow for the best direct integration of subjective, objective, and confidence-specific assessment, with many training programs integrating these mobile applications into their curriculum. Another example of advancement in the self-perceived confidence space was presented via the DaVinci Surgical System, with Intuitive introducing their "My Intuitive" mobile application, allowing instantaneous access to surgeon-specific operative metrics.<sup>23</sup> Previous studies have demonstrated a considerable divergence between the perceptions of attending surgeons and trainees regarding estimating operative participation.<sup>24</sup> The Intuitive application allows for comparison of the operating surgeon to the national average for the length of the procedure. Still, trainees can track metrics, such as time spent on the console during cases, case timeline and efficiency, instrument choreography, and peer-to-peer comparison when used with a dual surgical console. These application tools may present an avenue for tracking confidence and comfort level with reported robotic cases utilizing their metric data to support a trainee's claims of readiness to perform a given operation at the time of graduation. Such use in the optimization of the application could further be an opportunity to identify strengths or weaknesses,

allowing individualized actionable areas for feedback and discussion and aiding in a graduate's comfort in performing robotic procedures.

Other essential training aspects include feedback and autonomy, as both live feedback and autonomy have enhanced residents' confidence and facilitated their transition to independent practice.<sup>25-27</sup> There is little knowledge on the optimal balance between patient safety and resident autonomy, or the described "safe struggle;" however, graded increases in resident autonomy, such as chief resident services, are essential to address gaps in confidence and preparation for independent practice.<sup>28</sup> Thanks to the widespread use of smartphones and the development of mobile-based applications to provide timely and consistent feedback, implementation of a standardized system for feedback amongst urology residency programs is highly feasible.<sup>29,30</sup>

The overall impact of COVID-19 on graduate medical education is still largely unknown, though it is undeniable that many educational opportunities were disrupted with decreases in clinical and operative volumes.<sup>8</sup> The majority surveyed in this study (53/93) felt that COVID-19 did not impact graduating trainees' comfort in performing general urologic procedures.

Although most reported that COVID-19 did not affect their training, studies have shown a significant decrease in case volume for general surgery residents, likely reflected in urologic procedures.<sup>31,32</sup> Respondents did conversely report a considerable difference in whether they believed COVID-19 impacted trainees' decision to pursue a fellowship or general practice. This may be partly due to limitations in attending conferences and other critical networking events that influence residents' post-graduation plans. The impact of COVID-19 on graduating residents' education is not limited to the quantitative loss of operative experience but also impacts the maturation of clinical judgment, teaching, and leadership skills. Therefore, COVID-19 may have indirectly affected their decision to pursue further fellowship training, although our study did not specifically address this question.

Our findings suggest that there is a need for improvement in specific procedural training to increase resident confidence and competency. Some potential reasons for the lack of confidence of urology trainees include: insufficient time for advanced surgical skills laboratory experience, reduced programs training time from six to five years, and limited dedicated time to acquire manipulative skills in their 80-hour or more work week.<sup>7</sup> To track and accurately address

these discrepancies, surveys that evaluate graduating trainees' confidence should be administered, as surgical volumes and operations have begun to return to their pre-COVID-19 baseline, thus setting a baseline for each resident's progression. Additionally, annual surveys administered by the AUA in conjunction with in-service resident testing or the yearly member survey present an excellent opportunity to identify current needs for improving self-confidence and comfort in performing the ever-growing procedural base used by contemporary practicing urologists.

### Limitations

Our study is limited by a relatively small sample size per response group and the study's design to assess confidence opinions to be equated as readiness for practice rather than objectively measured technical skills of performance. Furthermore, the study analyzes de-identified responses and therefore limits the ability to directly compare the confidence of a single trainee to their respective program director. Still, this data may provide insight for future studies to assess perceptions and technical performance of urology residents in parallel with surgical abilities to help guide the development of individualized education based on specific procedural comfort levels.

### CONCLUSIONS

There appears to be a discrepancy between trainee self-evaluation and PDs' confidence assessments regarding the performance of certain urologic procedures. This lack of confidence is hypothesized to be multifactorial, including a lack of surgical simulation lab experience, reduced program training hours, and limited dedicated time to acquire manipulative skills in their clinical workweek. The results of our study become even more significant as the demand for the complexity of urologic procedures to be performed immediately upon completion of training may increase due to the purposed physician deficit. Our study helps highlight possible areas of innovation in residency programs to help improve the confidence of current residents.

While the study provides valuable insight into the perceived level of confidence among trainees, it is important to consider that the results of this data differs significantly between residents and fellows. Although a high level of comfort is ideal for graduating residents regarding the mentioned procedures, the fellows are only responsible for procedures pertaining to their fellowships. Therefore, a lack of confidence for a procedure that remains outside the realm of a

fellow's practice is expected. Further study designs can also incorporate reasons for the lack of confidence, such as low case volume, decreased autonomy during residency, or inadequate feedback or teaching in the operating room. Such data can be useful as it allows the programs to adopt practices from those programs where the residents/fellows feel more prepared.

COMPETING INTERESTS: The authors do not report any competing personal or financial interests related to this work.

This paper has been peer-reviewed.

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