# 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 transurethral resection of the prostate,

**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.

hydrocelectomy, vasectomy, and urethral sling were at or above (≥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 urological procedures independently.[1] These findings are even more concerning considering the expected decline in several practicing urologists and the aging patient population requiring increasing urologic care.[2] Currently, over half of practicing urologists in the United States are greater than 55 years old, including almost one-third of those who are older than 65 years.[3] McKibben et al. further projects a 46% deficit in urologists by 2035 if the current demand for urological services remains constant.[4] To further exacerbate the provider-patient discrepancy, reports from the most recent 2023 fellowship match indicated 134 applicants matched into 167 fellowship vacancies. This gap will further lead to sub-specialty under-representation.[5] 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.[6]

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, there remains to be an inconsistency between urology trainees and their program directors in the perceived availability 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.[7]

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. The COVID-19 pandemic placed potentially problematic limitations on educational exposure in clinics, the operating room, and opportunities provided through urological conferences to ensure safety. This disrupted clinical education required changes in the form that educational materials were presented, prioritizing virtual learning and video-based teaching to replace the previous paradigm of trainee education but leaving a void regarding those operative experiences that should have been included.[8]

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 program directors' and 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 program directors (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 SUNY University 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 Survey Monkey 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 6 months, from Jan 2021 through July 2021. A copy of the survey can be found in the supplemental materials (Supplement 1).

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 a questionnaire ranking their level of preparedness to perform common urologic surgical procedures using a Likert scale (1 to 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 some statements involving their feelings towards how the pandemic has shaped their academic and professional careers (Supplement 1).

### Statistical analysis and data management

Results and responses were tabulated using the Survey Monkey 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 3-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 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 trainee's distribution in the categories of age, race, and gender. However, there was a difference in their subspecialties and AUA sections. Mean Likert scoring for a comfort level with surveyed urologic procedures is noted in (Figure 1). Chi-squared analysis between the groups revealed statistically significant differences for transurethral 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 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 entering 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, there was a difference between PDs and trainees in their perception of the pandemic impact on the 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 United States have low confidence rates in independently performing urological procedures.[7,9] This lack of procedural confidence is common to urological surgery training as it has also been noted in obstetrics, gynecology, and oral-maxillofacial surgery trainees.[10,11] 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.[12,13] The reasons for this discrepancy are not well established and are considered multifactorial. Surgical specialties, however, may 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. Majority (93.1%) of fellowship PDs reported their trainees to be at or below the median Likert score (3 out of 5) compared to the 47.3% of fellows. The divergence in fellowship and residency PDs' confidence in their mentees' procedural abilities may also reflect a difference 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 a relatively lower comfort of trainees 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.[7] 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.[14,15, 16]

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.

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 above a Likert score of 3. Therein lies a space for innovations in training paradigms to address these exposure gaps in case-specific volume and difficulty through cadaveric models, 3-D printing, virtual reality robotic simulations, or animal models.[17-19] Simulations and training programs investigating urologic procedures have proven beneficial for training, including pyeloplasty, prostatectomy, and partial nephrectomy.[20-22] 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.

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.[23] Previous studies have demonstrated a considerable disagreement between the perceptions of attending surgeons and trainees regarding estimating operative participation.[24] 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, aiding in a graduate's comfort in 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.[25, 26,27] 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. [28] The widespread use of smartphones and developments of mobile-based applications to provide timely and consistent feedback, implementation of a standardized system for feedback amongst urology residency programs is highly feasible.[29,30]

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. [8] 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. [31,32] Respondents did conversely report a considerable difference in whether 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 6 to 5 years, and limited dedicated time to acquire manipulative skills in their 80-hour or more work week.[7] To track these discrepancies and accurately address them, 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.

## CONCLUSIONS

Historically, the AUA expects the graduating urology residents and fellows to feel comfortable performing all surgical procedures deemed necessary by the program. However, there appears to be a discrepancy between trainee self-evaluation and program directors' confidence assessments regarding the performance of certain urological 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. As expected, the surveyed trainees seemed to be least comfortable performing traditionally more complex and skilled procedures such as hypospadias repair, penile prosthesis, and orthotopic neobladder repair.

This trend of decreased comfort of graduating trainees is concerning as it relates to the current aging population of urologists; one-third of current urologists are older than 65 years leading to an expected 46% deficit in urologists by the year 2035. The results of our study become even more significant as the demand for the complexity of urological 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. We believe that the leading cause of such limitations is a lack of exposure to hands-on experience which can be addressed by cadaveric models, 3D printing, virtual reality robotic simulations, or animal-based models. Such simulations have proven beneficial and can provide valuable experience, especially for more complex procedures. Mobile applications such as the “My Intuitive” introduced by the DiVinci Surgical System allow instantaneous access to surgeon-specific operative metrics, which may provide valuable data for preparedness and confidence in surgical procedures.

Residency programs also improve trainees' confidence by optimizing how they receive feedback from their mentors during their training. Live feedback has been shown to enhance confidence; therefore, increasing the surgical time trainees receive feedback either in person or via other means may help them feel more confident in their capabilities. With the COVID-19 pandemic stabilizing, and the return of a traditional residency schedule it may potentially lead to improved confidence in trainees without any intervention. Residents and fellows will be able to see more patients and handle a broader caseload without the restrictions seen during the pandemic's peak. Further, our study indicates that the pandemic may have indirectly limited the number of trainees pursuing fellowship education, possibly due to the disruption of conferences and other networking events.

Our study limitations include the small sample size and the study’s design, which assesses subjective confidence rather than objectively measuring technical skills and performance. Additionally, participation in our surveys was voluntary; it is possible that those with strong opinions about their preparation were more likely to complete our surveys, creating a selection bias. Regardless, self-assessment is essential during training, and there is room for improvement to ensure higher confidence levels among trainees. Future studies could implement more direct measures of resident preparedness, such as operative metrics, frequency/severity of complications, and overall surgical outcomes.

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 among resident’s vs 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 to the realm of a fellow's practice is expected. Further study designs can also incorporate reasons for the lack of confidence whether that may be low case volume, decreased autonomy during residency, 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.

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## FIGURES AND TABLES

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

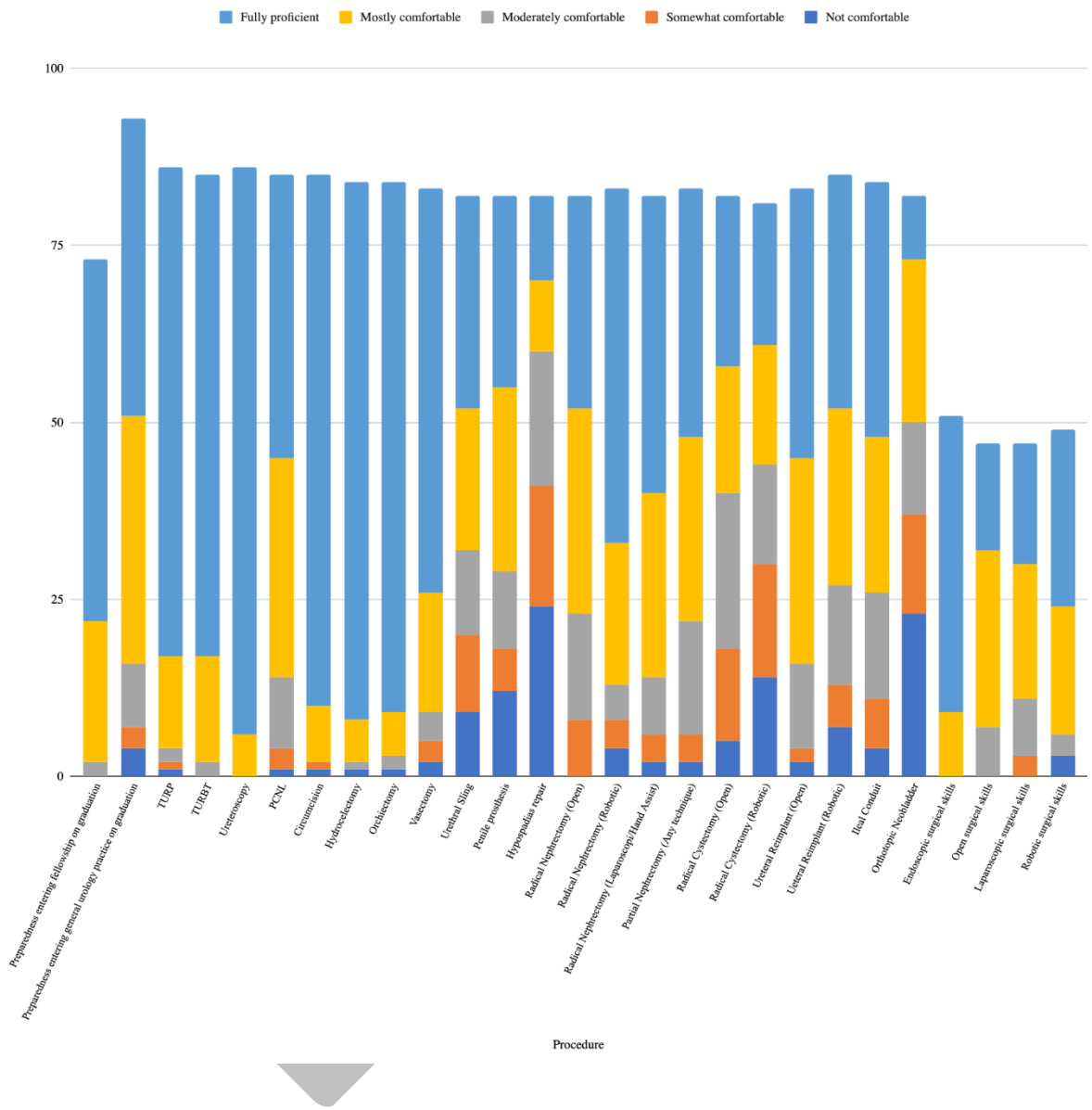

**Figure 2.** Graphs of COVID-19 impact survey responses.

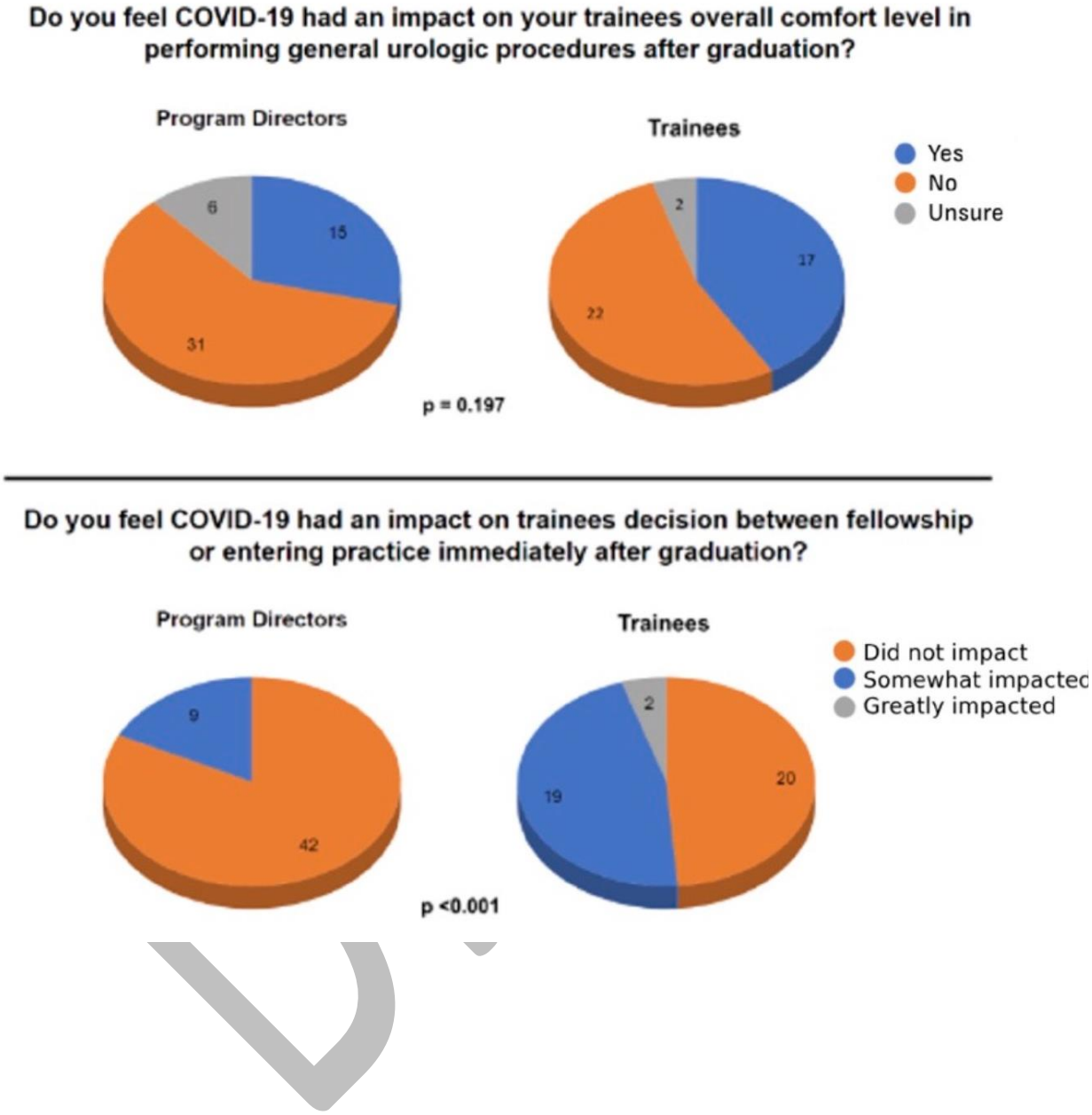

**Table 1.** Descriptive statistics of survey respondents

| Descriptive Statistics (N=Total Respondants) | Respondents (n) | P value |
|---|---|---|
| **Age (N=41)** | | 0.585 |
| 20-30 | 4 | |
| 30-35 | 27 | |
| 35-40 | 9 | |
| 40-45 | 1 | |
| **Race (N=41)** | | 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 | |
| **Gender (N=41)** | | 0.194 |
| Male | 30 | |
| Female | 9 | |
| Non-binary | 1 | |
| Prefer not to answer | 1 | |
| **AUA Section (N=95)** | | **0.018** |
| Western | 12 | |
| South Central | 9 | |
| North Central | 21 | |
| Southeatern | 12 | |
| Mid-Atlantic | 5 | |
| New York | 7 | |
| Northeastern | 12 | |
| New England | 11 | |
| Not affiliated with AUA section | 6 | |
| **Subspecialty (N=48)** | | **0.023** |
| Female Pelvic Medicine and Reconstruction | 3 | |
| Pediatrics | 6 | |
| Oncology | 11 | |
| Endourology | 18 | |
| Infertility | 2 | |
| Male Reconstruction | 6 | |
| Fertility | 1 | |
| Voiding Dysfunction | 1 | |

**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-value |
|---|---|---|---|---|---|---|
| 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** | **3.31±1.105 (29)** | **4.79±0.415 (24)** | **4.32±1.003 (19)** | **4.48±0.602 (21)** | **4.16±1.025 (93)** | **<0.001** |
| **TURP** | **4.31±1.050 (26)** | **4.95±0.213 (22)** | **4.83±0.383 (18)** | **4.90±0.308 (20)** | **4.72±0.680 (86)** | **0.003** |
| 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** | **4.00±1.251 (24)** | **4.71±0.561 (21)** | **4.56±0.984 (18)** | **4.80±0.410 (20)** | **4.49±0.929 (83)** | **0.024** |
| **Urethral Sling** | **2.96±1.581 (23)** | **4.43±0.676 (21)** | **2.78±1.353 (18)** | **4.30±0.865 (20)** | **3.62±1.385 (82)** | **<0.001** |
| **Penile prosthesis** | **2.91±1.649 (23)** | **4.43±0.598 (21)** | **3.00±1.572 (18)** | **4.10±0.788 (20)** | **3.61±1.394 (82)** | **0.002** |
| **Hypospadias repair** | **2.52±1.442 (23)** | **3.43±1.248 (21)** | **2.28±1.364 (18)** | **2.20±1.281 (20)** | **2.62±1.402 (82)** | **0.016** |
| 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 (Laparoscopi/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 |
| Ueteral 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** | **3.22±1.313 (23)** | **3.57±1.248 (21)** | **2.33±1.188 (18)** | **1.80±1.196 (20)** | **2.77±1.408 (82)** | **<0.001** |
| **Endoscopic surgical skills** | **4.67±0.480 (27)** | **5.00±0.000 (24)** | **-** | **-** | **4.82±0.385 (51)** | **0.002** |
| 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 to 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