



Strategies to Encourage Medical Student Interest in Urology

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Abstract

Purpose of Review Urology residency positions have steadily increased but applications have remained stagnant. This is an alarming trend given the aging general population and thus increased need for urologists. The purpose of this review is to describe barriers and suggest strategies to encourage medical students to pursue urology.

Recent Findings Barriers to interest in urology include educational factors, such as timing of exposure to urology in medical school, USMLE scores, research experience, and deciding in time for an early match, as well as socioeconomic barriers, such as cost, being underrepresented in medicine, and gender. Steps the urological community can take include increasing involvement in medical school curricula, increasing faculty mentor availability, and broadening students' range of urological experiences.

Summary Strategies to encourage interest in urology fall into three categories: creating interest, supporting interest, and removing barriers for students considering urology. Ultimately, the goal is to garner excellent residents in a field that must expand to meet the needs of a growing and aging population.

Keywords Urology · Medical student · Education · Residency socioeconomic barriers · Mentorship

Introduction

In 2020, the American Urological Association (AUA) match had a record 354 urology residency positions, an increase from 285 in 2014. However, the number of applicants over the same period has remained about the same, with 441 applications and an overall match rate of 83% in 2020 (Table 1) [1]. Given the increased number of residency positions, the growing need for urological care due to the aging US population, and the relatively high happiness outside of work reported by urologists relative to their peers in other specialties, it is

surprising that the number of applicants has not increased in tandem with the increase in residency positions [2]. To further compound the issue of recruiting medical students into urology, urologists as a group are aging and approaching retirement age, which is projected to lead to a larger shortage of urologists by 2035 [3•].

A survey of the literature reveals barriers that deter students from urology include academic factors, the application process, and certain socioeconomic factors. On the other hand, factors that motivate students to enter urology include clinical exposure, educational tools, and mentorship. By better understanding barriers that medical students face, as well as factors that motivate medical students to enter urology, the urological community can devise new or revise current strategies to encourage medical students' interest in urology and fill the increasing need for urological care (Table 2).

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Barriers to Medical Student Interest in Urology

Barriers medical students face in pursuing urology include educational factors, such as audition rotations and research, as well as socioeconomic factors, such as cost, underrepresentation in medicine, and gender. Another element worthy of

Table 1 Urology residency match statistics

	Jan 2020	Jan 2019	Jan 2018	Jan 2017	Jan 2016	Jan 2015	Jan 2014
Positions offered	354	339	325	319	295	296	285
Lists submitted	441	389	402	422	417	433	446
Matched	353	330	314	317	294	295	285
U.S. senior match rate	83%	91%	86%	82%	77%	77%	68%

Adapted from the 2020 AUA Urology Residency Match Statistics¹

mention is the burnout rate among urologists, despite their high career satisfaction. Without addressing these often intertwined barriers, medical students often face a high wall to entering urology that may deter even highly qualified students from applying in the first place.

Educational Barriers

Educational barriers that medical students face in choosing urology include medical school curricular obstacles, a common feeling among applicants that a research background is necessary, and the perceived difficulty of applying and matching to urology. Curricular barriers result from well-intentioned medical school curriculum committees that seek diversify medical student experiences as well as the inherent structure of medical education in the USA. Some schools, for example, only allow students to take a certain number of rotations within a given field. In other schools, students may take their surgical clerkship later in their third year, which compounds the already shortened deadline imposed by the AUA's relatively early match. Subsequently, many students have little to no exposure to urology as a field until their third or even fourth year, resulting in less time to decide on urology as a specialty to participate in multiple audition rotations, which are a strong predictor for matching into a given program [4–6].

The problem of limited time during medical school also arises in research. Anecdotally, many medical students are told that research is important for applying to surgical specialties. A large survey of US medical students found that one quarter had no research interest, and that a majority of medical students found research experiences to not be meaningful.

Barriers to involvement in research included the time necessary to complete research, lack of research mentors availability, and the perception that the student may not be appropriately acknowledged for their contributions [7].

Both curriculum design and the research conundrum factor into a larger barrier for medical students applying to urology: the perceived difficulty of matching into urology. While urology remains one of the more competitive specialties, this perceived difficulty likely further deters many qualified applicants. The first barrier that medical students must overcome in this sense is the United States Medical Licensing Examination (USMLE) Step 1 exam, where various “score cutoffs” are circulated among medical students. A study looking at the association of Step 1 score and specialty at their institution from 2011 to 2015 found that the mean USMLE Step 1 score was 243 for those matching in urology [8]. A large survey of program directors found that a lower Step 1 score was one of the most deleterious criteria for selection for interviews [9]. While this has historically been an important factor in applying to urology, the sponsors of the USMLE recently announced a change in Step 1 score reporting to make it purely a pass-fail examination [10]. For students considering applying to competitive specialties, this is a noteworthy change in one of the most significant selection criteria, and it raises the question of what will fill the role that the Step 1 score had as an “objective” measure for applicants. It remains to be seen whether USMLE Step 2 will become a requirement so that programs will have a new “objective” measure, adding further pressure to applicants who are attempting to balance multiple audition rotations and applying to urology, or whether programs devise more holistic ways of evaluating applicants.

Table 2 Barriers and strategies in medical student interest in urology

Barriers	Strategies
1. Gender and underrepresentation in medicine—lack of role models, negative experiences with patients or colleagues	1. Increase preclinical exposure to urology—faculty involvement in teaching 1st and 2nd year students; support of urology interest groups; and research opportunities between first and second year.
2. Financial cost of away rotations, applications, interviews	2. Required urology rotation during surgery clerkship.
3. Educational factors: USMLE Step 1 score, research, early match	3. Simulation and technology
4. High reported rate of burnout.	4. Mentorship

Gender/Underrepresentation

Gender and underrepresentation in urology are oft-discussed topics, as urology has remained a white male-dominated field even as other medical and surgical fields have diversified. Although the percentage of female applicants in urology has been increasing, male applicants still outnumber their female counterparts by double, while the match rate for male and female applicants is about equal [1]. The gender disparity has been studied from a number of angles, including mentorship and from trainees' perspectives. For example, the disproportionate underrepresentation of female urology faculty manifests as a lack of female mentors, impeding female students from considering urology—a finding corroborated in a study that found having more female faculty predicted having a higher number of female applicants [11••]. Further studies have found that having pediatric, trauma, reconstructive, and/or female pelvic medicine programs predicted a higher number of female applicants as they may be more interested in those subfields [12•]. Urology departments throughout the country have attempted to address the gender gap by hiring more female faculty and diversifying their clinical offerings, but the disparity remains [13]. Another unique barrier for females is misogyny within a male-centered field. A study of female urology residents found that over half of those surveyed had experienced negative behaviors from both male patients and colleagues [14]. Students from communities underrepresented in medicine also face similar barriers from lack of mentorship and faculty they can identify with. One study of residents in urology, surgery, and in general found that urology as a field had a lower proportion of student underrepresented in medicine compared to both surgical residents and residents in all fields, similar to the representation of women in urology [15]. Steps the urological community can take to mitigate these issues and improve female and underrepresented medical student engagement in urology include hiring diverse faculty, involving diverse faculty in direct medical education, providing sensitivity and implicit bias training for all attendings and residents, and fostering healthy work cultures where people feel comfortable discussing issues involving sexism or other hostile elements.

Cost

Another large barrier to pursuing a career in urology is the enormous time and money cost seemingly required by the application process. For urology applicants, the basic residency process is stretched out and inflated: students start considering where to do sub-internships midway through their third year, go through a competitive sub-internship application process with a financial and time cost, travel and pay to participate in month-long audition rotations in hopes of obtaining a letter of recommendation where they must secure stable

housing remotely, and then apply to residency programs. In 2020, the average number of programs applied to was 74, an increase from prior years, yielding a further cost since the application service has financial penalties for a larger number of applications [1, 16]. Once interview invitations arrive, students then arrange travel and lodging, often at the last minute and with little flexibility. Studies of urology applicants have found that the financial cost of applying to residency for subspecialties can be upward of \$7000 since almost 100% of applicants undertake away rotations [17•, 18•]. Given the rising number of applications students submit, it follows that the financial barrier to applying for urology will continue rising.

Because of this alarming picture, institutions and larger governing bodies have taken some steps to attempt to overcome the enormous financial burden that may deter students from considering urology. Multiple institutions offer scholarships for students from disadvantaged or underrepresented backgrounds that can be applied toward room, board, and transportation for audition rotations. Other institutions have low or no charge for visiting student rotators. In perhaps the most dramatic attempt to address this issue, all of the Canadian programs joined together to create the Canadian Urology Fair starting in 1994. After surveying students and programs in the pilot year of this program, the overseeing committee found that the cost to students was significantly less than traveling to interviews, the costs to programs were not significantly different than from hosting interviews, and that students missed fewer days of school compared to their counterparts in other surgical specialties who had to travel to interviews [19]. The main drawbacks to this process are the lack of the social element, for applicants are also interviewing the programs, and the fact that there are ten times as many urology residency programs in the USA than in Canada. One way to reconcile the Canadian model in the sprawling USA and thus reduce the cost barrier could be to adopt a similar model to music and dance school audition committees that host auditions at sites around the country, perhaps at regional AUA sectional meetings. In addition, the changes to the 2021 application process in response to the COVID-19 pandemic have resulted in residency programs creating new ways to connect with interested medical students. Anecdotal, these changes include virtual open houses, sub-internships, and interviews, as well as increased use of social media. It remains to be seen whether these changes will remain permanent if the pandemic subsides.

Burnout

Urology ranked highest (54%) in a 2020 Medscape National Survey of 15,181 physicians on Burnout and Suicide with the leading cause of burnout being too many bureaucratic tasks (55%), like charting and paperwork. Critics of these findings point to the limited sample size of urologists surveyed in the

past ($n = 119$) [2]. The 2016 AUA census data surveying a matrix sample of 1126 practicing urologists found a burnout rate of 38.8%, which is comparable to other specialties [20]. Nevertheless, a systematic review of factors influencing medical students' choice of subspecialty found that the third most important factor was controllable lifestyles or flexible work schedules (53%), following academic interests (75%) and competencies (55) [21]. High reported burnout rates in urology could deter student interest, especially in those concerned about work-life balance. Anecdotally, urologists report a high work-life balance satisfaction, so perhaps increasing medical student mentorship could combat the perception that urologists have a higher burnout rate.

Methods to Increase Medical Student Interest in Urology

Early Clinical Exposure

While medical students may have some exposure to urology prior to medical school, the initial exposure to most topics in medicine, including urology, occurs during the preclinical years of medical schooling. A number of studies have found that there is a paucity of exposure to urology in these formative years of medical school. Unfortunately, these studies have also found a decline in urology exposure. A 2007 study found that 32% of medical schools had no exposure to urology in the preclinical years [5]. A 2014 follow-up to this study found that this number had increased to 50% of medical schools not having urology exposure in the preclinical years [6]. This decline in urology exposure can be to the detriment of future patients, for as one study noted, knowledge of basic urology was low for both medical students and primary care faculty taking care of the bulk of communities [22].

As exposure is critical to fostering medical student interest in urology, it is imperative that the urological community devise strategies to increase and maintain exposure to the field of urology. One such strategy was studied in England where early sustained exposure to urology was correlated with considering a career in urology [23]. Despite this encouraging finding, the state of medical education in the USA seems to slant students away from pursuing urology, for a 2014 study found a decline in medical schools requiring urology rotations from 100% in the 1950s to 5% in 2014 [6]. Further compounding this is another discouraging report that 65% of American medical schools surveyed reported that it was possible to graduate from their school without any clinical exposure to urology [5].

Fortunately, a number of methods have been studied that increase students' knowledge of and exposure to urology, and thus hopefully increase their interest. While the number of studies and data obtained is limited, the variety of approaches

examined is encouraging in the way of urological educational innovation. Educational strategies that have specifically been studied in the urological literature include dedicated clinical rotations in urology, the use of simulators, the use of technology in education, the presence of a urology interest group, and mentorship.

Required Clinical Rotation in Urology

Multiple studies have found that having a clinical rotation in urology increases students' comfort in managing urological problems and potentially increases consideration of a career in urology. Clinical exposure to medical problems and treatments is crucial in cultivating, expanding, and reinforcing knowledge learned in the preclinical years. A study of outpatient versus inpatient settings for learning urology found that students in the outpatient clinical setting had a larger exposure to urological problems, better knowledge of urological physical examination, and were more likely to perceive that they learned more. Further, students in the outpatient setting may have greater exposure to urology faculty in the clinic compared to the floors, encouraging the mentorship needed to motivate students into a career in urology [24]. A study conducted 13 years later found similar results and expanded into acquiring skills such as foley catheter insertion [25]. By including students more in clinical management, such as in placement of foley catheters, a sense of inclusion in the team is fostered, further reinforcing the social bonds that encourage students to pursue urology. The social aspect to medical education and garnering student interest was reported in an earlier study where third year medical students felt that clinical learning followed by resident teaching to be the most helpful, whereas watching surgery, especially endoscopic surgery, to be less helpful [26]. This calls into question surgical clerkship structure where maximal operative exposure is encouraged, even in endoscopic or robotic cases, perhaps at the expense of the potentially more educational and social clinical setting.

Simulation and Technology

The use of various simulations in urological education has had mixed results in increasing interest in urology. A study of a clinical clerkship in urologic laparoscopy had a high level of interest and satisfaction among medical students, but did not find a change in the desire to pursue a career in urology [27]. A different study found that students' confidence in performing catheterization and digital rectal examination, especially female students' confidence, was improved post-simulation; while this study did not comment on the change in interest in pursuing urology, it did address an issue urology faces in recruiting female trainees [26]. The conclusion to be drawn from these experiences may be that simulations have an

adjunctive role in urological education, but may be less helpful in increasing interest in urology when used alone.

Similarly, the use of media and technology in urological education to allow for broader exposure to urology is inconclusive in the ability to attract students to urology. Two methods described in the literature include the use of a massive open online course (MOOC) and the use of a “learning package for medical students in a busy urology department.” The former method was innovative in that it was the first MOOC that expressly taught urology; while over 500 participants completed this MOOC and 82% of countries were represented, it neither commented on its utility in attracting students to urology nor was it specifically geared toward medical students [28]. In another study, the use of online “learning package for medical students” was helpful for learning core clinical problems. Again, this study did not comment on the utility of the online material in helping attract students to urology, and even its title emphasized important barriers for students considering a career in urology, namely lack of access to faculty mentors in a “busy urology department” [29].

Mentorship

The educational strategy that has been most uniformly effective in recruiting students to a career in urology has been mentorship. A study of why certain medical schools have more students pursuing urology found that mentorship was the single most important factor between schools [30]. This broader finding was confirmed in a study within a single school where having positive role models in urology led to a positive perception of urology and thus increased interest in urology [31]. Mentorship may be a helpful factor in helping bridge the gender gap in urology, as having a higher percentage of female urology faculty is correlated with a higher percentage of female students pursuing urology [11••]. A similar conclusion can be extrapolated to students underrepresented in medicine. One specific method that has been studied to connect medical students to mentors is the presence of a urology interest group, which has also been found to have a positive impact on medical student interest in urology [11••]. Other opportunities through which urology faculty can serve as mentors include offering research projects in urology during the summer between first and second year of medical school, leading small group or one-on-one sessions in first and second year clinical courses, and serving as teachers in preclinical classes like anatomy or male reproductive pathophysiology.

Creating a more formal mentorship program is a further step that the urological community can take to encourage students to enter urology. This idea was tested in Germany, where a national mentoring program for urology was started in 2006 and has continued since then due to an overwhelmingly positive response [32]. While this may seemingly be

more difficult in the more populous USA, the urological community remains small and well-connected, so a national, or at least regional, mentorship program may not be difficult to implement.

Regular Match

The early match requires that applicants decide before the end of third year if they are interested in urology. Switching to the National Residency Matching Program (NRMP) match, which occurs in March, may afford more time to students exploring urology late in third year and may increase the number of applicants. In 2006 otolaryngology, another competitive surgical subspecialty switched from an early match to the regular NRMP match. However, a comparison of the applicants and match rate before and after the change found no difference in the number of applicants or competitiveness of the specialty, suggesting a switch to the NRMP match may not necessarily lead to increased interest in urology [33]. It remains to be seen whether changes in the 2021 application cycle in response to the COVID-19 pandemic will have an impact on students applying to urology.

A recent viewpoint piece in JAMA suggests another alternative to the current early match and regular match: an optional early application and acceptance program. This strategy is akin to the early acceptance process used by colleges and universities and may suit several groups of students including highly competitive students with clear program choice or the seemingly less competitive students who may be hesitant in applying to a competitive field such as urology. Another advantage of this program would be a substantial reduction in time and cost expenditure as each applicant pursues fewer programs [34••].

Conclusion

Broadly speaking, strategies to encourage medical student interest in urology fall into three categories: creating student interest, supporting student interest, and removing barriers to students considering urology. To address the issue of encouraging medical student interest in urology requires a three-pronged approach and increased effort on the part of urology residency programs. Future steps that the urological community can take include increasing involvement in the medical school curriculum during the preclinical years, increasing faculty availability as mentors, broadening the range of urological experiences that students have, lowering academic and socioeconomic barriers, and finding ways to continue vetting quality applicants despite changes in board exam scoring and possible restrictions in the number of programs students can apply to. Ultimately, the goal is to continue garnering

excellent residents in a field that needs to expand to meet the demands of a growing and aging population.

Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

Human and Animal Rights and Informed Consent This article does not contain any studies with human or animal subjects performed by any of the authors.

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