

The Gatekeeper Disparity—Why Do Some Medical Schools Send More Medical Students Into Urology?

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Purpose: Urology continues to be a highly desirable specialty despite decreasing exposure of students to urology in American medical schools. We assessed how American medical schools compare to each other in regard to the number of students that each sends into urological training. We evaluated the reasons why some medical schools consistently send more students into urology than others.

Materials and Methods: We obtained American Urological Association Match data for the 5 match seasons from 2005 to 2009. We then surveyed all successful participants. The survey instrument was designed to determine what aspects of the medical school experience influenced students to specialize in urology. Bivariate and multivariate analysis was then done to assess which factors correlated with more students entering urology from a particular medical school.

Results: Between 2005 and 2009 a total of 1,149 medical students from 130 medical schools successfully participated in the urology match. Of the 132 allopathic medical schools 128 sent at least 1 student into urology (mean \pm SD 8.9 ± 6.5 , median 8). A few medical schools were remarkable outliers, sending significantly more students into urology than other institutions. Multivariate analysis revealed that a number of medical school related variables, including strong mentorship, medical school ranking and medical school size, correlated with more medical students entering urology.

Conclusions: Some medical schools launch more urological careers than others. Although the reasons for these findings are multifactorial, recruitment of urological talent pivots on these realities.

Abbreviations and Acronyms

AUA = American Urological Association

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THE AUA Match process has been one of the most selective in medicine with the number of applicants consistently exceeding the number of available positions.¹⁻³ Medical student decisions related to career choice are complex and influenced by a number of competing factors.^{4,5} Compelling data show that exposure to urology in American medi-

cal schools continues to decrease.⁶⁻⁸

However, little is known about how medical school factors influence the decision of medical students to enter urology.⁵ To our knowledge no public data exist to date on how medical schools compare to each other in respect to the number of medical students that each sends into urology. Understanding such

modifiable factors to recruit new trainees is critical in an era when the demand for urologists may soon exceed the supply.⁹ To assess how the medical school environment influences student decisions to enter the field of urology, AUA Match data from the last 5 years were obtained and a national survey of urology residents was performed.

PATIENTS AND METHODS

Study Population

We identified successful participants in the urology specialty match between 2005 and 2009. Each participant medical school and e-mail address were obtained from the AUA. AUA staff e-mailed a survey invitation to each successful participant with a functional e-mail address. No proxies or substitutions were accepted. Nonrespondents were sent up to 3 reminder e-mails during 2 weeks. All data were de-identified and analyzed in aggregate to preserve respondent anonymity.

Survey Instrument

Based on our literature review of factors impacting specialty choice among medical students we developed a Web based, 23-item survey instrument to test student, institution, specialty and peer specific factors (fig. 1). Key informant interviews were done to determine the content validity, readability and respondent level of understanding of survey questions, and verify the respondent time requirement. Members of the 2009 to 2010 AUA Residents Committee, who were current urology residents or fellows, served as an expert review panel for final survey testing.

Statistical Methods

Our primary outcome was the number of medical students matching into urology from each American medical school

during the 5-year study period. We constructed multivariate Poisson regression models to examine associations between predictors of interest and outcome after adjusting for confounders. The final models included respondent race/ethnicity, gender, medical school tuition and enrollment, urology departmental ranking, faculty count and residency duration. The final models also included whether the urology chairperson was charismatic or nationally prominent, whether the program director was available to medical students and whether urology residents were charismatic and available to medical students. All analysis was done with SAS®, version 9.2. All tests were 2 sided with $p \leq 0.05$ considered significant.

We calculated survey response rates in accordance with accepted definitions.¹⁰ Administrative approval was obtained from the AUA and institutional review board approval was obtained from Children's Hospital Boston.

RESULTS

Medical Schools and Urology Specialty Match

Between 2005 and 2009 a total of 1,149 medical students from 130 medical schools successfully participated in the urology match (table 1). An average \pm SD of 8.9 ± 6.5 medical students per medical school (median 8) were matched into urology during the study period (fig. 2). Mean medical school tuition was $\$36,297 \pm \$8,715$. Table 2 lists the top 20 medical schools in terms of the total number of students matched during the study period.

Response Rate and Respondent Demographics

Of 1,149 eligible urology residents 1,009 had a valid e-mail address, of whom 413 completed the survey

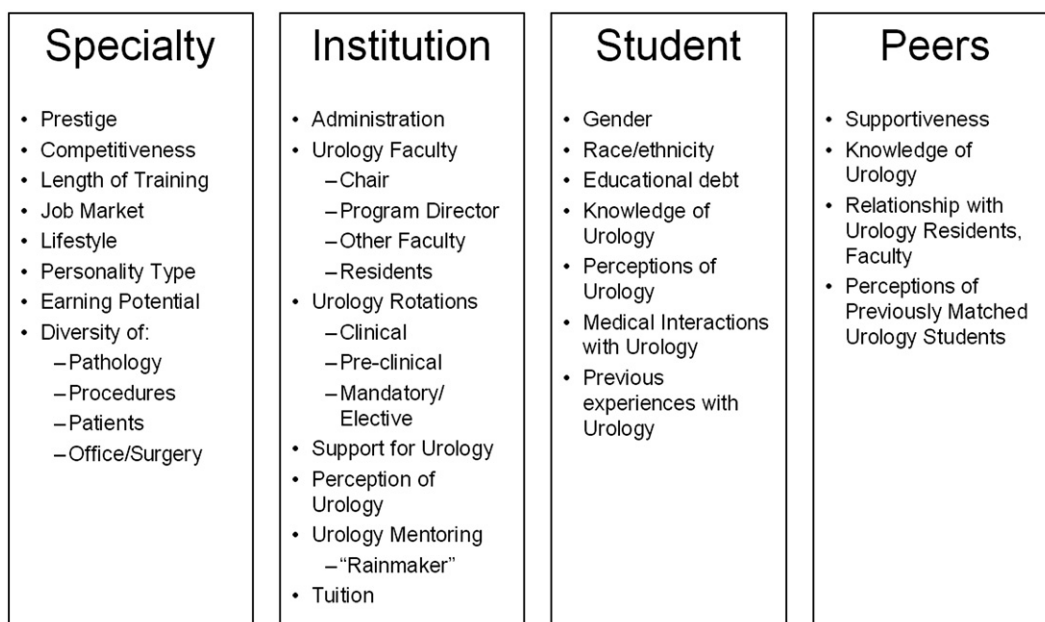


Figure 1. Four domains and descriptors of survey instrument used to query individuals who entered urology between 2005 and 2009

Table 3. Survey respondent demographic data

	No. Respondents (%)
Gender:	
M	292 (76)
F	92 (24)
Race:	
White	279 (71)
Asian	77 (19)
Hispanic	19 (5)
Black	12 (3)
Native American or Pacific Islander	6 (1)
Total educational debt (\$):	
Less than 10,000	56 (15)
10,001–50,000	9 (2)
50,001–100,000	30 (8)
100,001–150,000	57 (15)
150,001–200,000	65 (17)
200,001–250,000	97 (25)
Greater than 250,001	71 (18)

($r = 0.38$, $p < 0.0001$) and a larger urology faculty ($r = 0.46$, $p < 0.0001$) directly correlated with the number of successfully matched participants. Similarly a better urology departmental rank ($r = -0.26$, $p < 0.0001$) and to a lesser extent medical school research rank ($r = -0.11$, $p = 0.01$) correlated with the number of matched students. Schools with a urology residency program matched more students than those without such a program (average 14.1 vs 5.1, $p < 0.0001$), allopathic medical schools matched more students than osteopathic medical schools (13.5 vs 2.1, $p < 0.0001$), private medical schools matched more students than public medical schools (14.9 vs 12.4, $p < 0.0001$) and schools with a 6-year residency program matched more students than those with a 5-year residency program (16.2 vs 13.2, $p < 0.0001$). Medical school tuition ($r = 0.06$, $p = 0.05$) and the medical school primary care rank ($r = 0.09$, $p = 0.03$) only weakly correlated with urology match outcomes.

Of survey respondents medical schools with a mandatory clinical rotation in urology matched more students than those without such a rotation (20.2 vs 12.2, $p < 0.0001$). A longer mandatory urology rotation strongly correlated with an increased number of matched students ($r = 0.74$, $p < 0.0001$). Similarly medical schools with a basic/preclinical urology course matched more students than those without such a course (18.0 vs 12.5, $p = 0.0001$). There was no significant difference between schools that did and did not offer an elective urology rotation (13.7 vs 9.3, $p = 0.15$). However, only 8 respondents attended a medical school that did not offer an elective urology rotation.

An increased number of matched medical students was associated with departments where chairpersons were charismatic ($p < 0.0001$) and nationally prominent ($p < 0.0001$), program directors were

Table 4. Multivariate analysis of medical school factors associated with more students matching in urology on AUA Match

Factors	p Value
Medical school faculty size	<0.0001
6 vs 5-Yr urology residency	<0.0001
Supportive program director	0.004
Charismatic chairperson	0.01
High urology department ranking	0.02
Medical school class size	0.03

available to medical students ($p = 0.0005$), other faculty was charismatic ($p = 0.01$) and nationally prominent ($p < 0.0001$), and residents were charismatic ($p = 0.0005$), supportive ($p = 0.002$), available ($p = 0.0003$) and nationally prominent ($p < 0.0001$).

Multivariate analysis. Table 4 lists factors associated with students entering urology on multivariate analysis. Medical school tuition ($p = 0.18$), respondent race ($p = 0.53$) and gender ($p = 0.69$), educational debt level ($p = 0.89$), and a nationally prominent chairperson ($p = 0.27$) and charismatic ($p = 0.16$) or available ($p = 0.30$) urology residents were not associated with the number of successful match participants.

DISCUSSION

We report AUA Match data from 2005 to 2009, representing a unique data set provided by the AUA. All study investigators were 2009 to 2010 members of the AUA Residents Committee. These data reveal that the number of medical students going into urology varies widely based on medical school characteristics (fig. 2). A total of 20 medical schools (12.5%) sent 15 or more medical students (greater than 1 SD from the median) into urology. This small group of schools was responsible for educating 389 of the 1,172 members (33%) of the entire cohort that entered urology during this time. The most remarkable of these outliers is Northwestern University Feinberg School of Medicine, which sent 44 students into urology between 2005 and 2009. Such deviation from the median (5.5 SD) is truly remarkable and suggests that the educational climate at Northwestern University should be examined to determine why so many students choose urology as a specialty.

Generally the 413 respondents cited diversity of patient type, pathology and procedures, personality types in urology, earning potential and a strong job market as reasons to pursue urology as a career. Of the students 62% indicated that if they did not match into urology, they would have pursued another surgical specialty. Mentorship by the chairperson, faculty and residents was cited as very positive or as a very positive influence by most respondents,

similar to those from applicants to the 2003 to 2004 AUA Match reported by Kerfoot et al.⁵

On multivariate analysis several independent variables predicted a higher number of students entering urology. Larger class size and larger urology faculty were independently associated with more students going into urology. Medical schools with a 6-year urology residency program were more likely to send a larger number of students into urology than those with a 5-year program. This finding is intriguing but reasons for this observation could not be determined from our data.

Strong mentorship was suggested as a reason for more students entering urology.⁵ Respondents in our study rated their medical school urology chair, program director, faculty and residents on 4 characteristics, including 1) charisma, 2) supportiveness, 3) availability and 4) prominent national reputation. A strong urology chair and program director were each associated with high number of students entering urology from a given medical school. Charisma but not national reputation appeared to be an important quality for the program chair while the supportive nature of the program director was the significant factor in our analysis.

On multivariate analysis higher ranking of a urology department in *US News & World Report* correlated with more medical students entering urology ($p = 0.02$). Recently Sehgal reported that the overall ranking of urology programs is largely a function of the *US News & World Report* reputation score.¹¹ This is derived from the subjective responses of about 250 surveyed urologists across the country who are asked to generate a list of the 5 best urology programs. While the rank of a school according to *US News & World Report* may in fact influence medical students to enter urology, it is also possible that the number and quality of medical students interviewed during the AUA Match season may instead influence the program rank list supplied by these approximately 250 urologists.

We examined whether mandatory exposure to urology at a medical school correlated with more students entering the field. Concerns regarding decreasing exposure to urology in American medical schools were first raised in 1956.¹² Since then, a number of studies have documented a downward trend.^{7,8,13,14} Most recently a survey of 95 urology program directors revealed that there was no urology lecture in the physical diagnosis course at 50% of medical schools with an active urology program. At 34% of institutions exposure to urology had decreased during a 10-year period. At the time that this survey was done in 2007, only 20% of respondents reported having experienced a required medical student rotation on the urology service at their institution⁶ and a similar rate (17%) was reported by our respondents. Mandatory preclinical ex-

posure, mandatory clinical rotation and clinical rotation duration strongly correlated with more medical students entering urology on bivariate analysis but not in a multivariate model.

We are not the first to suggest that a mandatory urology rotation may not be critical for enlisting medical students into urology. In a survey by Kerfoot et al of 252 medical students who pursued a career in emergency medicine only 2% reported that absent exposure to urology on the clinical wards influenced their decision to pursue a career outside urology.⁵ Similarly only 25% of 248 medical students who entered urology reported that clinical exposure to urology significantly influenced their decision.

We examined a number of other medical school related variables which failed to show a relationship with the likelihood of medical schools sending students into urology (fig. 1). Several of these variables deserve mention. Students were asked about how informed, receptive and supportive the administration at their medical school was regarding urology as a career, the relationship of the administration with the urology faculty and the administration opinion of previous medical students who entered urology. These variables were not associated with the number of students entering urology. Identical questions were asked regarding medical school peers with similar results. Furthermore, the charisma, availability, reputation and supportiveness of urology residents had little effect on the tendency of a medical school to send medical students into urology.

Our survey only considered decisions of individuals who entered urology. Responses were not captured from those who applied to urological residency but did not successfully match into a training program or those who chose to pursue a career in another field. Data were collected during a 2-week period in 2010 and many individuals who participated went through the AUA match up to 5 years before completing the questionnaire. This interval between the match and the survey may have influenced participant responses. Furthermore, the imperfect response rate of 41% in this study had the potential to introduce response bias. Nevertheless, our response rate is within the range of commonly reported rates for medical professionals.¹⁵⁻¹⁷

Our analysis only included medical schools that sent at least 1 student into urology in the last 5 years. Medical schools that did not send students into urology between 2005 and 2009 were not captured in our analysis. Also, AUA Match data only include allopathic urology training programs while several osteopathic urology training programs that exist are not captured by AUA data. More importantly intangible variables, such as faculty leadership strength, esprit de corps among students and residents, and the medical school and/or urology

department ability to successfully navigate students through the match process are not fully reflected in these data. As in previous reports, our data on the status of mandatory urology exposure during medical school were obtained from survey respondents since such information is currently not available through the AUA.^{6,7} Due to an imperfect response rate and potential issues with respondent recall our data and those of others may be biased. We suggest that the AUA begin to collect data on medical student exposure to urology in medical schools in prospective fashion to more rigorously address this important issue in the future.

Despite its limitations our study is strengthened by the large number of respondents (413). Furthermore, this report integrates high fidelity, previously unavailable data from the AUA on AUA Match rates from all American medical schools. To our knowledge this is the first study to show heterogeneity among medical schools in sending students to urology and the high impact of a handful of medical schools in channeling talent into our field.

CONCLUSIONS

The current study presents previously unavailable data on the variability among American medical schools in sending medical students to urology. Survey results from successfully matched urology residents in the last 5 years reveal the importance of program director support, chair charisma, medical school faculty size, 6 vs 5-year program length and to a lesser extent medical school class size and urology department rank. This study only begins to answer questions on why a medical school such as Northwestern University is able to send an average of more than 8 medical students to urology yearly while other, seemingly similar institutions in some years fail to attract a single student into the field. Only by understanding the motivations, perceptions and incentives that influence the decision to pursue urology can we ensure that urology continues to attract high caliber talent into its ranks. Such issues are increasingly relevant in an era when the number of urologists is likely to grow.

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