Implementation of a shared research database to increase medical student awareness and involvement in urology research

A pilot study

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ABSTRACT

INTRODUCTION: We aimed to assess the effect of a shared institutional research database on medical students' scholarly work, perceived research competency, and self-reported satisfaction.

METHODS: An institutional inventory database was created on Google Sheets with a listing of available mentors and a description of their ongoing research projects. The inventory database was shared with interested students and faculty. Students who agreed to participate were surveyed pre- and post-inventory. Survey questions assessed student demographics, prior research experience, and their perception of research competency and satisfaction. The number of presentations, publications, and articles pre- and post-inventory were also abstracted. Survey responses were compared using the Mann-Whitney U test.

RESULTS: A total of 20 students were surveyed pre-inventory and at a median followup of six months (5–7) post-inventory. There was a significant increase in scholarly presentations and publications post-inventory ($p<0.05$ for all). Furthermore, post-inventory, students reported feeling more confident in establishing an academic career, finding good mentors, managing their relationship with their mentor, managing professional challenges, and effectively showcasing themselves professionally and describing their research ($p<0.05$ for all). More than 65% of students agreed or strongly agreed that the database was easy to use, accessible, transparent, and would like a similar database created for other specialty departments.

CONCLUSIONS: After performing mentorship-guided research through an institutional research database, medical students felt more confident in their ability to perform research and produced more scholarly work. Therefore, we recommend a research database be created across all institutional departments to foster interest in conducting research.

INTRODUCTION

Involvement in research represents an integral component of medical training.[1,2] Specifically, student involvement in research is one of the main factors many residency programs evaluate during the residency match process, particularly in competitive residency fields such as urology.[3,4] In fact, program directors surveyed nationally placed research as the sixth most important factor in the evaluation of applicants, with other categories, such as United States Medical Licensing Examination (USMLE) scores, letters of recommendation, and academic performance-taking precedence.[5] More contemporary data surveying urology residency program directors during the course of the COVID-19 pandemic has suggested that research experience is one of the most important factors in selecting applicants for interviews.[6] Furthermore, given the recent transition to a pass/fail score for the USMLE step 1 examination, there may be a potential for research involvement to play a more critical role in the match process.

In their systematic review and meta-analysis reviewing studies regarding medical student involvement in research, Amgad et al noted that student involvement in research may have several important implications; specifically, it is associated with improved short- and long-term scientific productivity, more informed career choices, and stronger interest towards performing future research.[7] Despite the importance and poten-

tial benefits of engaging in research, medical students may face significant barriers in conducting research, such as time, formal teaching of research methodology, and access to mentors.[8,9]

Considering the perceived importance of medical student involvement in research and the possible barriers students may face engaging in it, we sought to increase involvement in research and provide mentorship to medical students through the implementation of a shared institutional inventory database of urology research projects actively ongoing at our institution. We assessed the effect of the shared inventory database on students' scholarly work, perceived research competency, and self-reported satisfaction.

METHODS

Inventory database creation and student recruitment

After institutional review board approval, a shared institutional inventory database spreadsheet was created on Google Sheets (*www.google.com/sheets*) with available mentors within our academic urology department. The Google sheet included the title of the project, faculty's contact information, current fellow(s)/resident(s)/medical student(s) involved, description of the role for medical students who are interested, and status of the project. The inventory database was shared with interested students, faculty, and residents, and updated at four-month intervals. Medical students were recruited between August 2021 and April 2022 through urology interest group meetings, direct interaction with faculty and residents, project advertisements placed in the class GroupMe chat, or word of mouth.

Survey administration

Students who used the inventory database process to integrate into a research project and agreed to participate in the study were administered a non-anonymous survey via Google Forms that collected student demographic information, class year, prior research experience, reasons for conducting mentored research, and the challenges anticipated. Additionally, the survey included a series of five-point Likert scale questions relating to the student's perception of their research competency and career interests (Appendix available at *cuaj.ca*). Another survey via Google Forms was administered six months after conducting mentored research, which included a series of five-point Likert scale questions relating to their research competency and satisfaction (Appendix available at *cuaj.ca*). Students who filled out both the pre-inventory and post-inventory surveys were included.

Analysis

Frequencies and percentages were generated for demographic information. Survey responses regarding scholarly work, research competency, and satisfaction were reported as medians and their corresponding interquartile range (IQR) due to their non-normal distribution, as determined by the Shapiro-Wilk test. Pre- and post-inventory responses were compared using the Mann-Whitney U test. All tests were two-sided, with a significance threshold of $p<0.05$. Statistical analyses were performed using SPSS, version 28 (IBM Corp., Armonk, NY, U.S.).

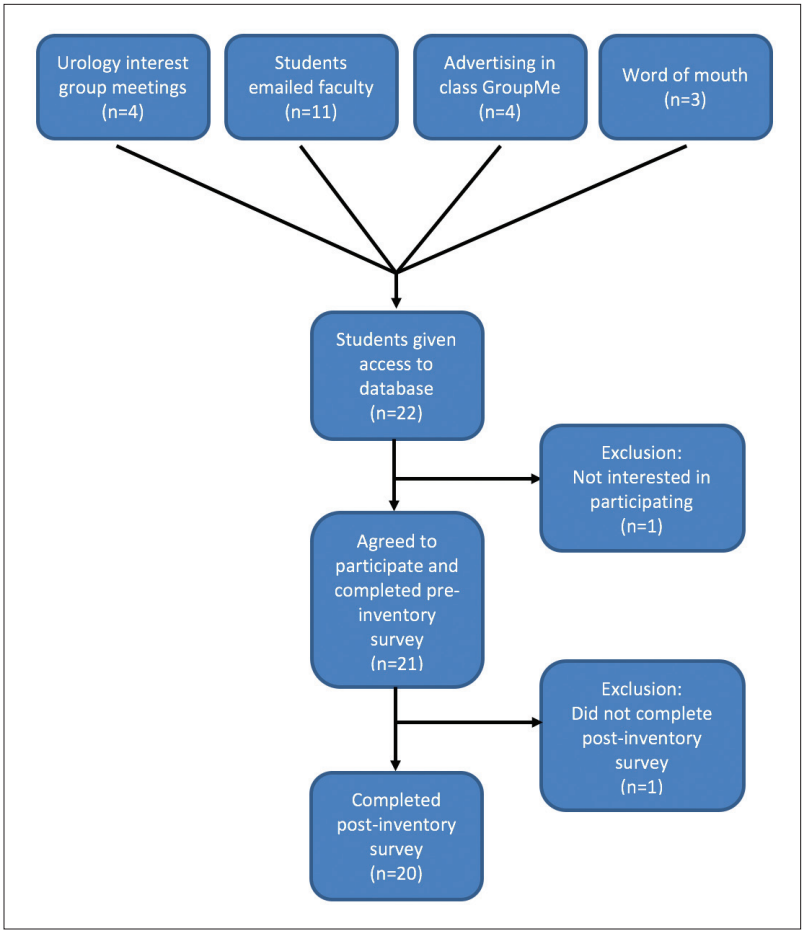

Figure 1. Flowchart of recruitment of students.

RESULTS

Pre-inventory survey responses

A total of 22 students were recruited, of which 21 agreed to participate and completed a survey at baseline. Of these 21 students, 20 (95.2%) completed a followup survey at a median of six months (IQR 5–7) after conducting mentored research and were included in the final analysis (Figure 1).

Most students were male (80.0%), in their first or second year of medical school (70.0%), and planned to conduct a summer-long research project (80.0%). All students had at least some sort of prior research experience and had previously collected data. Regarding scholarly work, most students had at least one poster presentation (55.0%) or peer-reviewed publication (60.0%), and some had at least one oral presentation (45.0%) or non-peer-reviewed article (30.0%). Common reasons students wanted to conduct mentored research were because they enjoyed doing research (90.0%) or wanted to be competitive for residency (90.0%). Common challenges anticipated by students were time management (25.0%) or learning how to design studies and collect/analyze data (25.0%) (Table 1).

Table 1. Student demographics and characteristics

Demographic/characteristic	All students
Sample size, N	20
Gender, n (%)	
Male	17 (85.0)
Female	3 (15.0)
Race/ethnicity, n (%)	
Caucasian	8 (40.0)
Latino/Hispanic	1 (5.0)
Middle Eastern	2 (10.0)
African American	1 (5.0)
South Asian	2 (10.0)
East Asian	7 (35.0)
Year in medical school, n (%)	
First year	7 (35.0)
Second year	7 (35.0)
Third year	3 (15.0)
Fourth year	3 (15.0)
Project type, n (%)	
Summer project	16 (80.0)
Year-long project	4 (20.0)
Prior research experience, n (%)	
None	0 (0.0)
A little	5 (25.0)
Some	7 (35.0)
Moderate	7 (35.0)
Substantial	1 (5.0)
Prior specific research experience, n (%)	
Designed a study	10 (50.0)
Collected data	20 (100.0)
Analyzed data	17 (85.0)
Reasons for conducting mentored research, n (%)	
Want to learn how to do research	13 (65.0)
Enjoy doing research	18 (90.0)
Want to network within the urology department	17 (85.0)
Want to be competitive for residency	18 (90.0)

Post-inventory survey responses

Post-inventory, most students had at least one poster presentation (65.0%), oral presentation (65.0%), peer-reviewed publication (75.0%), or non-peer-reviewed article (50.0%). There was an increase in poster presentations (1 [0, 3] vs. 2 [0, 4], p=0.027), oral presentations (1 [0, 2] vs. 2 [0, 3], p=0.009), peer-reviewed publications (1 [0, 2] vs. 2 [0, 5], p=0.007), and non-peer-reviewed articles (0 [0, 1] vs. 0 [0, 1], p=0.004). Additionally, students reported feeling more confident in choosing a career that best fit their interests (4 [3, 4] vs. 5 [4, 5], p=0.005), establishing an academic career (3 [3, 4] vs. 4 [4, 5], p=0.010), finding good mentors (4 [3, 4] vs. 5 [4, 5], p=0.002), managing their relationship with their mentor (4 [3, 5] vs. 5 [4, 5], p=0.008), managing professional challenges (4 [3, 4] vs. 4 [4, 5], p=0.011), showcasing themselves professionally (4 [3, 4] vs. 5 [4, 5], p=0.005), and describing their research (3 [3, 4] vs. 5 [4, 5], p=0.001). Mentored research did not change students' interest in pursuing urology (4 [3, 5] vs. 4 [3, 5], p=0.67) or an academic career (4 [3, 4] vs. 4 [3, 4], p=0.48).

Students agreed they had mentors who were able to provide support (4 [3, 5] vs. 5 [4, 5], p=0.010), were able to communicate their needs with their mentor (4 [3, 5] vs. 5 [4, 5], p=0.012), and understood the rules of authorship (3 [2, 4] vs. 4 [4, 5], p=0.001) and ways to disseminate research and scholarship (3 [2, 4] vs.

Table 1 (cont'd). Student demographics and characteristics

Demographic/characteristic	All students
Common challenges anticipated	
Time management	5 (25.0)
Conducting a project from start to finish	3 (15.0)
Meeting expectations of mentor(s)	3 (15.0)
Learning to design studies and collect/analyze data	5 (25.0)

5 [4, 5], p=0.001). The majority of students agreed or strongly agreed that the database was easy to use (75.0%), accessible (65.0%), transparent (75.0%), and would like a similar database created for other specialty departments (80.0%) (Table 2).

Students generally reported a positive personal experience with this model. Common remarks made by students praised the support they received from their mentors and the relationships they were able to build while conducting research. Areas of improvement suggested by students include mentorship between the first-year medical students and upperclassmen in the medical school, and more in-person events with mentors and other faculty for networking (Table 3).

DISCUSSION

We created an institutional, shared urology inventory research database for medical students and trainees to increase the accessibility of active research projects and mentoring opportunities. Through the inventory database, students were able to select projects of interest and subsequently reach out to the respective faculty/mentor to get involved. After conducting mentored research, there was an increase in scholarly work production and research competency. Furthermore, most students reported a positive experience with the inventory database and requested a similar inventory database created for other specialty departments.

The urology match has historically been a competitive process, highlighted further by the record low match rate in the 2021–2022 cycle.[10] Research experiences and output are a key component of an applicant's resume, with current residents having applied with a mean of nearly six publications and/or abstracts.[11] Although an increase in students' scholarly work may be seen in departments without a formal inventory research database, our findings show that with organized and transparent process to connect students to research mentors, medical students can foster a supportive relationship with their mentors while also

Table 2. Student scholarly work, research competency, and satisfaction pre- and post-inventory

	Pre-inventory	Post-inventory	p
Scholarly work			
Posters presentations at professional meetings	1 (0–3)	2 (0–4)	0.027
Oral presentations at professional meetings	1 (0–2)	2 (0–3)	0.009
Peer reviewed publications	1 (0–2)	2 (0–5)	0.007
Non-peer reviewed articles	0 (0–1)	0 (0–1)	0.004
Research competency			
Level of confidence in skills and abilities:			
To choose a career that best fits my interests	4 (3–4)	5 (4–5)	0.005
To be successful in an academic career	3 (3–4)	4 (4–5)	0.010
To find good mentors	4 (3–4)	4 (4–5)	0.002
To manage my relationship with my mentor	4 (3–5)	5 (4–5)	0.008
To manage professional challenges	4 (3–4)	4 (4–5)	0.011
To effectively showcase myself professionally	4 (3–4)	5 (4–5)	0.005
To effectively describe my research	3 (3–4)	5 (4–5)	0.001
Level of agreement with the following statements:			
I am interested in pursuing Urology	4 (3–5)	4 (3–5)	0.67
I plan to pursue an academic career	4 (3–4)	4 (3–4)	0.48
A research and/or academic career will best use my skills and training	4 (3–4)	4 (3–4)	0.80
I have mentors who provide strong support for my research interests	4 (3–5)	5 (4–5)	0.010
I am able to communicate my needs to a mentor	4 (3–5)	5 (4–5)	0.012
I understand the rules of authorship	3 (2–4)	4 (4–5)	0.001
I understand the various ways to disseminate research and scholarship	3 (2–4)	5 (4–5)	0.001
Satisfaction			
The mentorship improved my understanding of research		5 (4–5)	
I would sign up again to be mentored knowing what I know now		5 (4–5)	
I had a good understanding of my role in the research process		5 (4–5)	
I received adequate support from the institution to pursue my research interests		4 (3–5)	
I am more likely to pursue research in the future because of my mentorship experience		5 (4–5)	
The research database was easy to use		5 (3–5)	
The research database easily accessible		5 (3–5)	
I liked the transparency of current ongoing projects the research database provided		5 (4–5)	
I would like a similar database to be created for other specialty departments		5 (4–5)	

Values presented as median (interquartile range).

Table 3. Student perceptions with mentored research

Personal experience
"I appreciate how involved the residents and faculty were with research and their willingness to let medical students lead projects and take ownership." – Fourth-year medical student
"Research team has been highly supportive, with ample opportunities to get involved. Participation in research has helped me learn more about the field and think through and develop competency in different research methodologies." – First-year medical student
"Mentors in the department are very open to student research and allow great autonomy for students." – Fourth-year medical student
"A large portion of my successes in research has been having encouraging mentors that continue to support me throughout the process." – Third-year medical student
"Mentorship has been particularly helpful in learning how to navigate big-picture ideas/questions that come up in research, analysis, and ethics. Good mentorship has made me even more interested in pursuing urology." – Third-year medical student
"My research experience was greatly aided by having the guidance of a mentor. I wish that I had this experience earlier in my medical school career, but regardless, it will be highly beneficial to my professional and academic career." – Fourth-year medical student
"My current research experience with the urology department has been incredible! I've learned so much from different faculty mentors and upperclassmen/resident mentors on how to start, carry out, and complete a research project. My mentors are very understanding, informative, and supportive, which I really appreciate as a first-year medical student with little clinical research knowledge. I'm still learning how to navigate professional interactions with faculty mentors and how to strengthen those relationships, but I'm sure that will come with time. The social determinants research projects have been especially interesting and valuable and have really made me excited about research in the field of urology as an undecided first-year. Excited to continue pursuing these projects and building these mentorship relationships!" – First-year medical student
"Mentored research gave me the opportunity to get involved with projects that I found interesting. I was able to get better at manuscript writing, data analysis, and formulating new project ideas. I connected with other attendings in the urology department as a result of conducting mentored research." – Third-year medical student
Areas of improvements
"More collaboration between students, maybe try to do mentoring between MS1s and MS2/3/4s." – Third-year medical student
"I think having occasional (and obviously optional) in-person events, whether they are specifically focused on research or just for building connections, would be very helpful for students to feel more involved in their research projects and give a personal touch to some of the work they are doing." – Third-year medical student
"Improvements could be more monthly meetings with mentors or team outings to get to know everyone better!" – Third-year medical student

increasing their scholarly Although research is heavily emphasized in the urology residency match process, medical students within our pilot study were just as likely to seek out mentored research because they enjoyed the process. The challenges most commonly anticipated included time management and the logistical process of how to design and conduct a study, which may be best addressed through personalized advice and guidance of mentors.[12] Our findings show that medical students felt more confident in their ability to design, conduct, and showcase their research because of mentorship. Interestingly, however, students did not change their plans to apply to urology or pursue an academic career. It would be interesting to increase our followup time and see if this still holds true as students continue on their career path.

Lastly, our pilot study shows that students are seeking supportive mentors and streamlined communication. Our inventory database was able to facilitate these interpersonal relationships. Students were nearly unanimously satisfied with their experience and would recommend a similar inventory database to be created for other departments and specialties. We surmise that this could be a valuable tool adopted by urology programs for identifying interested students early, although areas cited for improvement included more frequent and in-person meetings and collaboration between students and mentors. We hope that this will increase in the wake of the COVID-19 pandemic.

Limitations

This study is not without limitations.

First, there is a small sample size, which may impact the generalizability of our results; however, given that our study is a pilot study and the small nature of the field of urology, accrual of a larger sample size will require a longer study period.

Second, our followup period was only six months. A longer followup period would be valuable to assess ultimate matriculation in urology residencies and future

career development, such as pursuit of fellowships or positions in academia.

Third, we did not survey the mentors. Future studies may include the mentor's experience with their students and the database.

Fourth, the increase in research competency may be due to the recruitment process rather than the inventory database.

Finally, the survey was not anonymous and, therefore, can introduce biased responses. Despite these limitations, our pilot study presents a procedural intervention to streamline medical student access and involvement in research that other institutions may choose to adopt.

CONCLUSIONS

After performing mentorship-guided research facilitated by a shared, institutional inventory research database, medical students experienced enhanced knowledge and understanding, along with perceived competency in conducting research. Additionally, the interactions between students and mentors facilitated research productivity and future interest in carrying out research. Therefore, we recommend a centralized, shared institutional inventory research database be created across all specialty departments to foster students' interest in conducting research and connect them with appropriate mentor(s).

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REFERENCES

1. Daus K, McEchron M. The impact of medical student research as a discussion topic during the residency interview process. *BMC Med Educ* 2021;21:556. https://doi.org/10.1186/s12909-021-02989-x
2. Fernandez A, Chen V, Quan J, et al. Evaluation of a medical student research and career development program to increase diversity in academic medicine. *Acad Med* 2019;94:1220-8. https://doi.org/10.1097/ACM.0000000000002760
3. Huang MM, Clifton MM. Evaluating urology residency applications: What matters most and what comes next? *Curr Urol Rep* 2020;21:37. https://doi.org/10.1007/s11934-020-00993-0
4. Frei E, Stamm M, Buddeberg-Fischer B. Mentoring programs for medical students — a review of the PubMed literature 2000–2008. *BMC Med Educ* 2010;10:32. https://doi.org/10.1186/1472-6920-10-32
5. Weissbart SJ, Stock JA, Wein AJ. Program directors' criteria for selection into urology residency. *Urology* 2015;85:731-6. https://doi.org/10.1016/j.urology.2014.12.041
6. Ahmed M, Joshi V, Alamiri J, et al. A survey of urology residency program directors assessing criteria to interview applicants during the COVID-19 pandemic. *Urol Pract* 2021;8:472-9. https://doi.org/10.1097/UPJ.0000000000000233
7. Amgad M, Man Kin Tsui M, Liptrott SJ, et al. Medical student research: An integrated mixed-methods systematic review and meta-analysis. *PLoS One* 2015;10:e0127470. https://doi.org/10.1371/journal.pone.0127470
8. Siemens DR, Punnen S, Wong J, et al. A survey on the attitudes towards research in medical school. *BMC Med Ed* 2010;10:4. https://doi.org/10.1186/1472-6920-10-4
9. Matloubieh JE, Eghbali M, Abraham N. Strategies to encourage medical student interest in urology. *Curr Urol Rep* 2020;21:34. https://doi.org/10.1007/s11934-020-00984-1
10. Grauer R, Ranti D, Greene K, et al. Characterization of applicant preference signals, invitations for interviews, and inclusion on match lists for residency positions in urology. *JAMA Network Open* 2023;6:e2250974-e2250974. https://doi.org/10.1001/jamanetworkopen.2022.50974
11. Kim JE, Kim IE Jr, Lee JJ, et al. Characteristics of medical schools in the United States associated with successful match into urology residency programs: Analysis of the 2016–2021 urology resident cohort. *Urology* 2022;172:33-43. https://doi.org/10.1016/j.urology.2022.08.047
12. Lee GSJ, Chin YH, Jiang AA, et al. Teaching medical research to medical students: A systematic review. *Med Sci Educ* 2021;31:945-62. https://doi.org/10.1007/s40670-020-01183-w

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