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Mentors' experiences in an osteopathic medical student research program

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Abstract

Context: Medical students, especially at osteopathic medical schools, have limited research exposure. Systematic instruction in research, supervised by qualified mentors, could motivate osteopathic medical students to pursue research in their careers, thereby increasing the number of future clinician-scientists. Recruiting and retaining suitable research mentors are crucial to sustaining such programs, but this task is also particularly challenging for osteopathic medical schools.

Objectives: To assess mentors' experiences in a voluntary student-mentor medical research program.

Methods: An online survey was sent to 76 university- or hospital-based participants who previously mentored 219 medical students between 2014 and 2019. The questionnaire consisted of 13 items with responses in checklist, five-point Likert scale, and categorical multiple-choice formats, assessing motivation for participation, satisfaction with the program, and interest in future participation. Data were analyzed descriptively, and responses from mentors at the university and hospital were compared using univariate logistic and ordinal regression analyses.

Results: Among 70 (92.1%) mentors who responded to the survey, 61 (87.1%) reported being motivated by a desire to help medical students learn research. Forty-nine (70.0%) mentors indicated that furthering their own research

productivity was a motivation, and hospital-based mentors were statistically significantly more likely to endorse this source of motivation (OR=2.02; 95% CI=1.18–3.45; p=0.01). Most respondents were satisfied with the quality of the students' work (59 [84.3%]) and with the program (59 [85.5%]). However, 46 (65.7%) suggested the program could be enhanced by requiring medical students to be physically present in the clinic or laboratory for a minimum amount of time. Importantly, most (58 [84.1%]) mentors reported that they would be interested in participating in future mentored research programs.

Conclusions: Mentors were motivated to participate in the voluntary research program for both altruistic and professional reasons. Since most mentors reported being satisfied with the program, it is likely they would participate in future mentored research programs. Our results suggest that mentors viewed this voluntary research program as mutually beneficial.

Keywords: medical education; medical student; mentoring; research.

Educating medical students in the art and science of medical research and providing research opportunities are potential solutions to the declining number of clinician-scientists. Medical students are frequently interested in medical research [1, 2]. In a previous meta-analysis [1], three or four studies showed each of the following results: students who conducted research in medical school were more likely to be interested in conducting research in their careers and pursue academic careers; later in their careers, they were more likely to attain faculty rank, conduct research, and publish research [1]. However, in 2019, 43% of college osteopathic medicine (COM) graduates reported receiving inadequate training in research techniques [3]. Indeed, compared with their peers in allopathic medical schools, COM students graduate with fewer scholarly works, including peer-reviewed publications and presentations, which may adversely affect their ability to compete for residency training programs [4].

The systematic training of medical students in research is costly and such programs are difficult to sustain. Among

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other barriers, there is a shortage of available mentors to provide appropriate guidance and supervision [5]. Yet, focus groups of medical students have indicated that they view mentors as being critical in influencing them to pursue careers as clinician-scientists [6]. This shortage of mentors may be more common among COMs. For instance, in surveys of all 2019 allopathic medical school [7] and COM [3] graduates in the US, respondents from COMs were less likely to report feeling satisfied or very satisfied with faculty mentoring in general (52 vs. 81%). Furthermore, enthusiastic, qualified physicians who wish to serve as research mentors at COMs may lack the protected time and resources necessary for research activities [8]. Compared with allopathic medical schools, COMs have fewer faculty members [9, 10]; faculty members have fewer articles published and fewer citations per article [11, 12]; and they receive less grant funding from the National Institutes of Health [13]. Thus, understanding the expectations and perceptions of research mentors is critical to designing sustainable mentored student research programs at COMs [14]. Physicians who voluntarily participate but do not view the experience positively are unlikely to continue in the program [14]. Ideally, the program should be mutually beneficial for both the student and the mentor, particularly if mentors have limited time or resources to conduct research. A mutually beneficial program can simultaneously address the clinician-scientist shortage on two fronts: training future and assisting current investigators.

Since 2014, medical students at the Texas College of Osteopathic Medicine (TCOM), University of North Texas Health Sciences Center (UNTHSC) have been participating in the Pediatric Research Program (PRP) guided by mentors located at two participating training sites: the main campus of UNTHSC and Cook Children's Medical Center (CCMC), which is a large pediatric healthcare system. Students who apply to participate in the PRP are interviewed and successful candidates are selected each year, depending on the availability of mentors. Research mentors include university faculty, community-based practicing physicians, and other healthcare professionals who voluntarily participate. Following an orientation, mentors are coached by qualified and experienced PRP faculty (R.B., W.P.B., D.W., and T.H.) and staff who oversee the program. Students assigned to CCMC work with a fulltime project manager (T.H.) who helps coordinate meetings and assists mentors and students with study design, data collection, statistical analysis, publication, and presentation. Every student has one mentor—the principal investigator of the study—who takes primary responsibility for guiding the student during his or her participation in research study. Most

students also work with other researchers and/or healthcare staff associated with the study.

Students begin their research experience during the summer break between their first and second years of medical school. For one month, they work closely with a mentor on study activities (e.g., literature review, data collection, protocol development, and manuscript writing). All students give an oral presentation of their findings in the fall and are required to submit their abstract to at least one conference. Many students present their work at local, regional, and national professional conferences, and several students have had their work published in peer-reviewed journals. Long-term mentor-mentee relationships are encouraged and often continue until students graduate or beyond.

The purpose of the present study was to examine the experiences of research mentors.

Methods

An online survey (Supplemental Material) was developed by PRP managers (T.H. and R.B.) in consultation with mentors; research staff, who support mentors' research, served as subject-matter experts to help validate the survey's content. The questionnaire contained 13 items with responses in checklist, five-point Likert scale, and categorical multiple-choice formats that asked for mentors' level of satisfaction with the program, feedback on the structure of the PRP, and motivations for participating. All mentors from the 2014 through 2017 cohorts were surveyed in September 2017. Mentors from the 2018 and 2019 cohorts were surveyed in August 2018 and July 2019, respectively. To improve the response rate, the survey was emailed to the mentors up to four times at two week intervals, and those who did not respond were subsequently given printed surveys. Because part of the purpose of the survey was to identify interested mentors for future cohorts, it was not anonymous. The survey was developed in Qualtrics (Qualtrics, LLC).

Respondent characteristics and responses to quantitative items were described with frequencies and percentages. The impact of location (CCMC vs. UNTHSC) on responses was analyzed using univariate logistic regression analyses. For Likert-type items, ordinal regression with a proportional odds model was used. Inferential analyses were checked for test assumptions, and a p -value <0.05 was used as a cutoff for statistical significance. Data were analyzed in SAS Enterprise (version 6.1; SAS Institute Inc.). Graphs were developed using RStudio (RStudio, Inc.). For mentors who responded to surveys in multiple years, the most recent survey was used. This study was approved by the CCMC institutional review board (IRB) as a quality improvement project and determined exempt by the UNTHSC IRB.

Results

Surveys were sent to 76 mentors (CCMC, 49 [70.0%]; UNTHSC, 27 [30.0%]) who had mentored 219 (CCMC, 139 [63.5%]; UNTHSC, 80 [36.5%]) students. Responses were

obtained from 70 mentors (31 [44.3%] men; 39 [55.7%] women), yielding a 92.1% response rate (RR): 43 (61.4%; RR=87.8%) from CCMC and 27 (38.6%; RR=100.0%) from UNTHSC. Among respondents, 38 (54.3%) were physicians, 19 (27.1%) held a PhD, and 13 (18.6%) were other professionals (five [7.1%] nurses, three [4.3%] pharmacists, three [4.3%] DrPH, one [1.4%] dietitian, and one [1.4%] research associate).

With regard to mentors' motivations for working with medical students, 61 (87.1%) reported a desire to help students learn how to conduct research. A minority of mentors endorsed any specific reason involving wanting research support—starting research (30 [42.9%]), data entry (25 [35.7%]), writing a manuscript(s) (21 [30.0%]), and research staff support (13 [18.6%])—yet, the majority of respondents (49 [70.0%]) selected at least one of these four professional motivations.

Most mentors were “very satisfied” or “somewhat satisfied” with the quality of the work produced by the student(s) (59 [84.3%]) and with the structure of the program (59 [85.5%]). However, when asked whether students should be required to be present in the clinic or laboratory a minimum number of hours each week during the summer, the majority answered “yes” (46 [65.7%]) or “don't know” (10 [14.3%]). Most respondents reported that they were “very interested” or “somewhat interested” in mentoring future medical students for the PRP (58 [84.1%]) and, to a lesser degree, for research rotations (46 [65.7%]).

Using logistic regression analyses, mentors from CCMC and UNTHSC were compared in their responses to questions about motivation, satisfaction, and interest. Responses did not statistically significantly differ by location in reporting motivations to help students, for help in starting research, for help in data entry, or for

Table 1: Mentors' reported reasons for working with PRP student(s).

Reasons	CCMC	UNTHSC	OR (95% CI)	p-value
To help student(s) learn research			0.88 (0.42–1.84)	0.73
Yes	37 (86.0%)	24 (88.9%)		
No	6 (14.0%)	3 (11.1%)		
For help starting research			1.22 (0.74–1.99)	0.44
Yes	20 (46.5%)	10 (37.0%)		
No	23 (53.5%)	17 (63.0%)		
For help with data entry			1.66 (0.97–2.87)	0.07
Yes	19 (44.2%)	6 (22.2%)		
No	24 (55.8%)	21 (77.8%)		
For help with writing manuscript(s)			1.94 (1.05–3.58)	0.03
Yes	17 (39.5%)	4 (14.8%)		
No	26 (60.5%)	23 (85.2%)		
For research support staff			1.00 (0.54–1.86)	0.99
Yes	8 (18.6%)	5 (18.5%)		
No	35 (81.4%)	22 (81.5%)		
Professional motivation^a			2.02 (1.18–3.45)	0.01
Yes	35 (81.4%)	14 (51.9%)		
No	8 (18.6%)	13 (48.1%)		

^aThese include help starting research, with data entry, with writing manuscript(s), and/or research support staff. CI, confidence interval; CCMC, Cook Children's Medical Center; OR, odds ratio; PRP, Pediatric Research Program; UNTHSC, University of North Texas Health Sciences Center.

research support staff. Mentors at CCMC were statistically significantly more likely to report wanting help in writing manuscript(s) (OR=1.94; 95% CI=1.05–3.58; p=0.03), and they were more likely to select at least one professional motivation involving research support (OR=2.02; 95% CI=1.18–3.45; p=0.01; Table 1). There were no statistically significant differences between locations in satisfaction with students' work or the structure of the program (Figure 1), and there were no significant differences

Figure 1: Mentors' satisfaction with the pediatric research program (PRP) stratified by location. CCMC, Cook Children's Medical Center; PRP, Pediatric Research Program; UNTHSC, University of North Texas Health Sciences Center.

Figure 2: Mentors' future interest in the pediatric research program (PRP) stratified by location.

CCMC, Cook Children's Medical Center; PRP, Pediatric Research Program; UNTHSC, University of North Texas Health Sciences Center.

between locations in interest for working with students in the PRP or research rotations (Figure 2).

Discussion

The PRP provides an opportunity for osteopathic medical students to conduct extracurricular research concurrently with their medical school training. Students are mentored by qualified faculty, community-based physicians, or other healthcare professionals who voluntarily participate. The primary objective of the program is to introduce medical students to the principles of research. For such a program to be sustainable, volunteering mentors must view it as being worthwhile and, ideally, beneficial to themselves and to participating students [14, 15]. Our study explored mentors' perceptions of their PRP experiences by examining their responses to a self-report online survey.

For students to learn and to have a positive experience, mentors ideally should offer guidance [5] and encourage students to take an active role rather than simply collecting data [16]. Consistent with prior research on mentoring students in clinical practice [17], most mentors in our survey reported that they participated to help students. In our study, most mentors also indicated that they chose to work with students as a means of obtaining assistance with their own research (i.e., starting research, data entry, writing, staff support), though the specific reason or reasons given differed by mentor. It is critically important to understand what motivates a research mentor, to increase the likelihood of future participation [14, 18]. The PRP helps mentors by having medical students and research staff complete tasks that busy clinicians may have insufficient time to complete (e.g., literature reviews, statistical analysis, or

methodological assistance). University-based clinical faculty may lack protected time for research and many lack research staff support, but community clinicians typically have even less time and support for research than their academic colleagues [19]. Therefore, it is not surprising that, compared with university faculty, hospital clinicians were significantly more likely to indicate that they participated in the PRP to receive assistance with their research. Mentors will be more likely to participate in the future if the program genuinely provides assistance with their research. Fortunately, most mentors in our study—whether at the university or at the hospital—were satisfied with their students' work. Finally, in line with the above results, most mentors in our study expressed a willingness to continue their participation, which will likely help sustain the PRP for future medical students.

While most mentors reported being satisfied with the structure of the program, most mentors also thought that students should be required to be on campus a minimum number of hours per week. Because this program is voluntary for students, having a universal attendance policy may result in students becoming less interested in participating, resulting in attrition. Nonetheless, students are informed that some mentors and projects will demand more time than others. In our subjective experience, many of the students selected to participate in the PRP exceed the recommended time guidelines and take advantage of the program's flexible work schedule. These considerations underscore the importance of matching students with suitable mentors [20]. It is important to match students' strengths and availabilities with mentors' needs. Perhaps these factors should be weighted more heavily than the students' interests and the mentors' fields; these considerations have received greater focus in selecting and matching students in recent cohorts.

Websites for some COMs describe mentored student research programs, but few have published the results of their programs; the present data is a step toward filling this gap in the literature. Our results provide evidence of success in providing a mentored student research program. Although limited to a single academic institution, these findings will hopefully assist other COMs in achieving similar success. The PRP provides a unique and cost-effective solution to the problem of limited qualified mentors in COMs, as it relies on a close and mutually beneficial collaboration with a local hospital. Although information about COM-sponsored research programs for medical students is limited, there is a program at Ohio University Heritage College of Osteopathic Medicine (OU-HCOM) that collaborates with several outside institutions [21]. In addition to medical students, the OU-HCOM program includes residents and fellows from numerous institutions. Both the OU-HCOM program and the PRP utilize research personnel to support the students and physicians, who often lack time for or expertise in research.

Limitations

While our results are promising, they must be interpreted with an appropriate understanding of the limitations. Most importantly, the present results reflect a mentored student research program from only one COM. During the six years covered in this study, the PRP has been a very successful program for 219 students who worked under 76 mentors. Still, the extent to which the present results are generalizable to other institutions is unclear. Owing to a dearth of relevant publications, it was not possible to compare our results to that of other COMs. It is important that more COMs publish information that describes their program as well as share helpful insights and “lessons learned” with other osteopathic academic medical centers. Further research is needed to facilitate a better understanding of the scope and success of all COMs mentored student research programs. Such an endeavor would provide valuable data and help to improve existing programs.

Conclusions

A structured research program utilizing voluntary mentors is an inexpensive yet productive means of teaching medical students the value of medical research. Understanding the motivation and satisfaction of mentors who participate in such a program is critically important in

achieving success and sustainability. Our mentor respondents were motivated to participate in the voluntary research program for both altruistic and professional reasons; since most mentors reported being satisfied with the program, it is likely they would participate in future mentored research programs. Our results suggest that mentors viewed this voluntary research program as mutually beneficial, so use of qualified volunteer mentors is feasible, although more research is clearly needed.

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Competing interests: Authors state no conflict of interest.

Informed consent: Participants in this survey study provided informed consent.

Ethical approval: This study was approved by the Institutional Review Board at Cook Children's Health Care System as a quality improvement project and deemed exempt by the Institutional Review Board at University of North Texas Health Science Center.

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