

## The Influence of the STORM Program and Other Elective Experiences During the Summer Between the First and Second Year on Medical Students' Career Interests

Mara S. Cunningham, B.A., Justin O. McCartney, B.S., William F. Cathcart-Rake, M.D.

University of Kansas School of Medicine–Salina, Salina, KS

Received April 22, 2022; Accepted for publication June 2, 2022; Published online Sept. 21, 2022  
<https://doi.org/10.17161/kjmvoll5.17939>

### ABSTRACT

**Introduction.** The purpose of this study was to investigate the influence of the Summer Training Option in Rural Medicine (STORM) program and other elective experiences during the summer between the first and second pre-clerkship years of medical school on medical students' career intentions.

**Methods.** A retrospective voluntary and anonymous cohort study was conducted by distributing an email survey to the 211 second-year medical students at the University of Kansas School of Medicine (KUSM). The survey consisted of a variety of questions regarding their recent summer break elective experiences.

**Results.** Eighty-nine students (42.2% response rate) completed the survey; 21 respondents participated in the STORM program. Important factors influencing the choice of an elective included, working one-on-one with an educator, hands-on experiences, and receiving academic credit. Sixty-seven respondents (75.3%) concluded that their experience met their expectations, 50 (56.2%) concluded that their experience helped solidify their career goals, while 20 (22.5%) concluded that their experience made them question their career goals. Eleven respondents (12.4%) wished they had participated in a different summer experience, and 16 respondents (18.0%) changed their career plans after their summer experience.

**Conclusions.** A break between first and second years of medical school allowed students to explore career options; such experiences may ignite a particular passion, solidify an already determined specialty choice, or dissuade a student from pursuing a particular career pathway. Medical school affirmation of the importance of significant, sustained, and student-chosen opportunities to work one-on-one with a mentor and engage in hands-on learning during the pre-clerkship years is crucial. The STORM program was one elective option that delivered on students' expectations. *Kans J Med* 2022;15:311-318

### INTRODUCTION

Clinical experiences during the early pre-clerkship years of medical school are important determinants of a medical student's professional learning and development.<sup>1</sup> These experiences may help a student focus on a particular career pathway or dissuade them from pursuing a particular medical specialty. Factors influencing students' decisions to consider certain medical specialties have been the subject of multiple previous reports.<sup>2-7</sup>

Mentorship has a major influence on career choice. Wright et al.<sup>2</sup> surveyed graduating students and found that a positive role model was associated strongly with a medical students' choice of a residency discipline. Jordan et al.<sup>3</sup> studied senior medical students at the University of Western Ontario in Canada who matched to a Canadian family medicine residency program. They found that family physician mentors were an important influence on the students' decisions to pursue a career in family medicine. Stagg et al.<sup>4</sup> reported that for students spending time shadowing in a specific specialty, whether they considered that specialty or not, the greatest influence on career choice was a high-quality teacher/mentor. The converse was also true; a poor teacher/mentor tended to dissuade medical students from pursuing a career in that field. They also found that preceptors in free-choice preceptorships had a stronger influence on career choice than those in required preceptorships.

Pre-clerkship research and clinical specialty experiences can influence a student's career intentions. Boyle et al.<sup>5</sup> found that early research exposure positively influenced students' decisions to include research as an integral part of their future medical career. In a systematic review of the literature, Marshall et al.<sup>6</sup> found that student experiences during the surgical rotation were associated with a higher interest in a career in surgery. A positive experience was determined by a variety of factors, including, positive role models, a welcoming atmosphere, and active participation in the operating room.

Scott et al.<sup>7</sup> surveyed students at eight Canadian medical schools at the beginning of medical school and again before the students entered clinical clerkships to determine why students may have switched career plans. Twenty percent of the students switched career plans. Seven factors influenced the switch: medical lifestyle, encouragement, positive clinical exposure, economics or politics, competence or skills, ease or residency entrance, and discouragement by a physician.

Pre-clerkship enrichment opportunities give students a break from the demands of their pre-clerkship studies. In a recent report from the University of Kansas School of Medicine, it was ascertained that enrichment activities in pre-clerkship years provided a welcome change of pace from the normal curriculum in addition to giving them opportunities to explore and discover.<sup>8</sup>

KUSM has three campuses, the main metropolitan campus in Kansas City, an urban regional campus in Wichita, and a rural regional campus in Salina. Medical students at all KUSM campuses have a 10 week break during the summer between their first and second year of medical school. During this time, students can participate in a variety of elective enrichment experiences: (1) the Summer Training Option in Rural Medicine (STORM) program, (2) a variety of basic science or clinical research experiences, (3) robust clinical preceptorships, (4) apply for a fellowship sponsored by the Department of History and Philosophy of Medicine, and (5) work as a medical preceptor at a summer youth camp. Students also can opt for a vacation, a respite from the demands of medical school. Most of the KUSM-approved summer enrichment experiences provide academic credit towards graduation and a small monetary stipend.

Approximately 30 first year KUSM students are selected for the STORM program. Students in this unique program spend four to eight

weeks in a rural Kansas community working with a family medicine physician. Each student receives medical school credit and a stipend for their participation. The aim of the STORM program is to expose medical students to family medicine in rural Kansas.<sup>9</sup> Kansas has a shortage of physicians in rural areas,<sup>10</sup> and the STORM program exposes medical students to the rewards and challenges of rural primary care, hoping that many will be attracted to rural family medicine.

This study focused on the influence of the STORM program and other summer experiences between the first and second year of pre-clerkship classes at KUSM on medical students' career intentions, what factors influenced a students' choice of an experience and what influence the experience had on the students' future career intent. The results may provide guidance to future medical students regarding the value of such experiences and how best to spend breaks in the formal pre-clerkship curriculum. Additionally, the results provided KUSM educators feedback regarding summer experiences and provide evidence of the importance of participating in similar enrichment activities during pre-clerkship years to other medical schools.

## METHODS

An invitation to participate in an anonymous online 25-question REDCap<sup>®11,12</sup> survey was sent to the 211 members of the KUSM Class of 2024 during the first week of their second year of classes. The survey asked a variety of questions regarding student demographics, preliminary career plans, choice of summer experiences, satisfaction with their summer experiences, and changes in career plans after their summer experience (Appendix). Many questions required Likert-scale rankings. There were also several open-ended questions. Two additional emails (two and four weeks after the initial invitation) were sent to class members reminding them to complete the survey. The survey was closed approximately five weeks after it was opened. There were no incentives offered to the students for completing the survey. Participation was voluntary, and all responses were anonymous. The data collected from the survey were analyzed using univariate statistics. This study's protocol was approved by the University of Kansas Medical Center Institutional Review Board.

## RESULTS

Of the 211 students invited to complete the survey, 89 responded (42.2%). The populations of the respondents' legal residences upon admission to medical school are noted in Table 1 and the distribution of respondent experiences is noted in Table 2.

Of the 21 respondents participating in the STORM program, 11 (52.3%) were previous residents of communities with populations less than 10,000. However, interest in the STORM program was not confined to students from rural communities; eight students from communities greater than 50,000 also participated in this rural preceptorship program.

Of these various experiences, 1 (1.1%) lasted two weeks, 1 (1.1%) lasted three weeks, 21 (23.6%) lasted four weeks, 1 (1.1%) lasted five weeks, 12 (13.5%) lasted six weeks, and 53 (59.6%) lasted eight weeks. Eighty-seven of the 89 respondents participated in their elective experience for four weeks or more, enough time to immerse themselves in the discipline chosen.

**Table 1. Population of respondents' hometowns.**

Population	Number (%) of Respondents
< 5,000	19 (21.4%)
5,000-10,000	7 (7.9%)
10,000-25,000	2 (2.3%)
25,000-50,000	7 (7.9%)
50,000-100,000	9 (10.1%)
> 100,000	45 (50.6%)

**Table 2. Distribution of respondent experiences.**

Summer Experience	Number (%)
Clinical research	32 (36.0%)
Summer Training Option in Rural Medicine (STORM)	21 (23.6%)
Clinical preceptorships other than STORM	12 (13.5%)
Basic science research	11 (12.4%)
Other (Dept of History and Philosophy of Medicine fellowships, graduate teaching assistant, required military service)	9 (10.1%)
Vacation	3 (3.4%)
Youth camp volunteer	1 (1.1%)

Eleven respondents (12.4%) wished they had participated in a different summer experience; interestingly, 5 of the 11 participated in a clinical research elective, while one participated in a public health elective, two engaged in basic science research, two took the summer off, and one participated in a clinical experience other than STORM. None of the students in the STORM program voiced dissatisfaction. Of the 21 respondents that participated in the STORM program, 10 voiced their intention to eventually practice in a rural community prior to their summer experience and did not change their mind afterwards. Eight students intending to practice in an urban setting prior to STORM still were interested in urban practice after STORM. One student changed from urban to rural practice. One student initially interested in rural practice was uncertain about future plans, and one student remained committed to a clinical practice combined with research career.

Sixteen respondents (18.0%) changed their career plans after their summer experience. There was no one specialty that respondents either disliked or gravitated to after their summer elective. Forty-five of all respondents (50.6%) and 19 of the 21 STORM participants (90.5%) received career counseling during their summer experience.

Likert scores were analyzed to determine the importance of the factors that influenced students' summer experience decisions (Table 3) and in rating their summer experience and its influence on career plans (Table 4). Four categories evolved: (1) Important or Agree (Likert scores of 4 or 5), (2) Neutral (Likert score 3), (3) Not important or Disagree (Likert scores of 1 or 2), and (4) Does not apply.

**Table 3. Important characteristics of summer experiences.**

Survey Question	Important/Very Important Number (%)	Neutral Number (%)	Low Importance/ Not Important Number (%)	Does Not Apply Number (%)
How important was receiving a stipend?	35 (39.3%)	11 (12.4%)	18 (20.2%)	25 (28.1%)
How important was it to work 1-on-1 with a clinician or researcher?	62 (69.7%)	7 (7.9%)	10 (11.2%)	10 (11.2%)
How important was it to receive school credit for the experience?	59 (66.3%)	13 (14.6%)	10 (11.2%)	7 (7.9%)
If a clinical experience, how important was it that the experience was rural?	13 (14.6%)	14 (15.7%)	25 (28.1%)	37 (41.6%)
How important was it that the experience was hands-on?	60 (68.2%)	10 (11.4%)	7 (8.0%)	11 (12.5%)
How important was it that you were able to choose the physician or researcher who supervised your summer experience?	39 (43.8%)	17 (19.1%)	20 (22.5%)	13 (14.6%)
How important was it that you were able to choose the location of your summer experience?	58 (65.2%)	11 (12.4%)	7 (7.9%)	13 (14.6%)
How important was the potential for patient interaction (ability to perform a history and physical exam)?	42 (47.2%)	9 (10.1%)	15 (16.9%)	23 (25.8%)

**Table 4. Satisfaction with summer experience and influence on career plans.**

Survey Question	Agree Number (%)	Neutral Number (%)	Disagree Number (%)
Summer experience met my expectations	67 (75.3%)	13 (14.6%)	9 (10.1%)
Summer experience helped solidify my career goal	50 (56.2%)	30 (33.7%)	9 (10.1%)
Summer experience made me question my career goal	20 (22.5%)	24 (27.0%)	45 (50.6%)

Students at KUSM chose their summer experiences for a variety of reasons. Major considerations for KUSM students (important to > 60% of respondents) included: working one-on-one with a physician or researcher, receiving school credit, having hands-on experience, and being able to choose the location of the experience. Twenty of 21 participants in the STORM program said hands-on experiences and the ability to perform history and physical exams were important or very important factors for choosing a summer experience. Less important factors for all respondents (important to < 40% of respondents) included receiving a stipend and location of the experience in a rural area.

Sixty-seven respondents (75.3%) concluded that their experiences met their expectations, 50 (56.2%) concluded that their experience helped solidify their career goals, while 20 (22.5%) concluded that their experience made them question their career goals. Nineteen of the 21 participants (90.5%) in the STORM program concluded that their experiences met their expectations, 14 (66.7%) concluded that their experience helped solidify their career goals, while 5 (23.8%) concluded that that the experience made them question their career goals.

Students were asked to expound on why they chose a particular summer experience (Table 5). Responses varied considerably, but some common themes became evident. Nearly 25% of the respondents chose their specific experience to explore career interests/options, and approximately one-third of respondents wanted a clinical experience. Twenty percent of respondents requested a research experience, believing that it was an important addition to their resume.

The final question in the survey asked the student to comment on how their experience helped solidify their career goals and to explain why or why not (Table 6). Two predominant sentiments emerged: (1) the summer experience helped the student achieve a better understanding of their proposed medical discipline choice, and (2) the impact of the experience on career planning, whether it solidified their choice or gave them reasons to doubt their original choice.

### DISCUSSION

Working one-on-one with a mentor/teacher who provided hands-on experiences was a major determinant in the choice of summer experiences for the responding group of KUSM students who had finished their first year of medical school. The importance of mentorship noted in this study confirmed the findings of previous investigators.<sup>2-4,7</sup> KUSM students were able to choose among a variety of elective experiences and noted the importance of being able to choose the location of their elective, echoing the findings of Stagget al.<sup>4</sup>, who found that free-choice preceptorships had a stronger influence on career choice than required preceptorships.

A significant cohort of respondents (48.3%) chose to participate in clinical or basic science research. Given that the USMLE Step 1 exam was changed to pass/fail starting in 2022, students may have concluded that a high Step 1 score was no longer a requisite for a competitive residency slot and a research experience on their resume may improve their chances to secure a position of their choosing.

Thirty-six of the respondents (40.4%) elected a clinical experience (21 of the 36 participated in the STORM program). KUSM students

**Table 5. Selected open-ended responses regarding students' choices of summer experiences.**

"I picked the summer experience I did because I was uncertain about whether or not I wanted to do family medicine or rural medicine in general and I was hoping that STORM could give me the experience to make that decision."
"I chose to do an elective rotation in the emergency room at .... medical center. I choose this because I am on the KMS loan and emergency medicine is one of the options I can do for residency while still meeting loan terms. I'm primarily interested in pediatrics but had never been in an ER setting and wanted to see what it was like since it's an option under my loan."
"Need research to be competitive in specialties. I was also interested in what I was researching."
"During M1 year, I felt that I had a relative lack of clinical experience. I grew up in a smaller town, so I have always been interested in rural medicine. I always wanted to explore western KS because I had never been, and I felt that even if I end up specializing in a more urban area, I would want to be able to relate to patients from across the state."

**Table 6. Selected open-ended responses regarding whether the summer experience helped students understand what career path they wanted to pursue.**

"Yes, I am even more interested in rheumatology after my summer research experience."
"I think it did. It showed me that I might be more content in a career field that offers some sort of procedures, if it is not entirely procedure based. I enjoyed the patient interactions that I had during visits that didn't require a hands-on procedure, but I just felt a much different excitement when it was sutures or ingrown toenail removals."
"Yes, research is not for me, and I will not pursue it as a career."

in the class of 2024 completed their first year of medical school during the COVID-19 pandemic, which dramatically impacted already limited clinical experiences, as it has affected medical students globally.<sup>13</sup> The promise of a robust clinical experience, especially hands-on experiences and working one-on-one with a physician, during the summer break may have been attractive to many students, providing them with an opportunity to work with patients prior to their clerkship years. The STORM program offered students the desired clinical experiences.

A break between first and second years of medical school allowed students to explore career options, and half of the respondents noted that they received career counseling from a mentor/supervisor. A minority of students were dissatisfied with their summer experience; however, it was notable that students engaged in a clinical research elective comprised half of those who wished they had engaged in a different experience. The reason for dissatisfaction with clinical research was unknown but should be investigated. The majority of students concluded that their summer elective experience solidified their career choice, and a minority of students voiced a desire to change their career intentions following completion of their summer elective.

A response rate of 42% in this study was not unexpected given that there are more pressing demands placed on medical students than completing a voluntary survey and that there were no incentives provided to respondents. Another possible criticism of the study was the limitation of the survey to only the new second-year students; however, the investigators were interested in the career aspirations of pre-clerkship medical students. Nevertheless, the factors influencing decision making by a significant number of pre-clerkship students with regards to early enrichment experiences and the impact of those experiences on career choices were elucidated.

## CONCLUSIONS

Determining what characteristics students find important in choosing an enrichment experience early in their educational program can guide medical schools in tailoring these experiences to match students'

interests. For example, medical school affirmation of the importance of significant, sustained, and student-chosen opportunities to work one-on-one with a mentor and engage in hands-on learning by providing such experiences to pre-clerkship medical students may ignite a particular passion, solidify an already determined specialty choice, or dissuade a student from pursuing a particular career pathway. KUSM should be particularly proud of the success of the STORM program and continue to offer this or similar opportunities to pre-clerkship medical students. This program satisfied many students' need for a robust clinical experience, met their expectations, and helped solidify the career intentions of the majority of participants. Hopefully, this program will result in increased numbers of students eventually choosing to practice in rural Kansas. The KUSM educational leadership team also needs to investigate why a significant number of respondents were unhappy with their clinical research elective. Finally, the importance of offering ample research opportunities to students cannot be underestimated.

Current and future medical students are encouraged to take advantage of any class-free intervals in their early/pre-clerkship formal curriculum to participate in a clinical experience, such as the STORM program, or a research project. Such experiences can have a profound impact on their understanding of what they would like to do for a future career and can complement other KUSM career counseling services, such as those provided by Career and Specialty Advising in Learning Communities (CASA), a longitudinal mentoring and advisement program. Introduction to a mentor, someone who can provide wise counsel, in the pre-clerkship years is also another potential benefit of the summer elective program. Early clinical experiences can help students start the process of considering career options one to two years before a residency decision is necessary and may influence the students' choice of clinical electives during the clinical years. Even if the experience went differently than originally planned, the opportunity to learn and grow from that experience can be invaluable, redirecting focus towards a different career path.

**ACKNOWLEDGEMENTS**

The authors thank Guilia Bonaminio, Ph.D., Senior Associate Dean for Medical Education, for her editorial assistance.

**REFERENCES**

- <sup>1</sup> Dyrbe LN, Harris I, Rohren CH. Early clinical experiences from students' perspectives: A qualitative study of narratives. *Acad Med* 2007; 82(10):979-88. PMID: 17895663.
- <sup>2</sup> Wright S, Wong A, Newill C. The impact of role models on medical students. *J Gen Intern Med* 1997; 12(1):53-56. PMID: 9034946.
- <sup>3</sup> Jordon J, Brown JB, Russell G. Choosing family medicine. What influences medical students? *Can Fam Physician* 2003; 49:1131-1137. PMID: 14526865.
- <sup>4</sup> Stagg P, Prideaux D, Greenhill J, Sweet L. Are medical students influenced by preceptors in making career choices, and if so how? A systematic review. *Rural Remote Health* 2012; 12:1832. PMID: 22283791.
- <sup>5</sup> Boyle SE, Cotton SC, Myint PK, Hold GL. The influence of early research experience in medical school on the decision to intercalate and future career in clinical academia: A questionnaire study. *BMC Med Educ* 2017; 17(1):245. PMID: 29228999.
- <sup>6</sup> Marshall DC, Salciccioli JD, Walton S, et al. Medical student experience in surgery influences their career choices: A systematic review of the literature. *J Surg Educ* 2015; 72(3):438-445. PMID: 25544332.
- <sup>7</sup> Scott I, Gowans MC, Wright B, Brenneis F. Why medical students switch careers: Changing course during the preclinical years of medical school. *Can Fam Physician* 2007; 53(1):95, 95:e.1-5, 94. PMID: 17872616.
- <sup>8</sup> Kallail K, Shaw P, Hughes T, Berardo B. Enriching medical student learning experiences. *J Med Educ Curric Dev* 2020; 7:2382120520902160. PMID: 32030355.
- <sup>9</sup> University of Kansas Medical Center, Office of Rural Medical Education. Summer Rural Program. 2012. <https://www.kumc.edu/school-of-medicine/office-of-rural-medical-education/student-programs/summer-rural-program.html>. Accessed 31 December 2021.
- <sup>10</sup> Greiner KA, Paolo A, Kennedy M, et al. Kansas Physician Workforce Report. The University of Kansas Medical Center and the Kansas Department of Health and Environment Office of Local and Rural Health. Kansas Workforce Advisory Board, Topeka and Kansas City, KS; March 12, 2007.
- <sup>11</sup> Harris PA, Taylor R, Thielke R, et al. Research electronic data capture (REDCap)--a metadata-driven methodology and workflow process for providing translational research informatics support. *J Biomed Inform* 2009; 42(2):377-381. PMID: 18929686.
- <sup>12</sup> Harris PA, Taylor R, Minor BL, et al. The REDCap consortium: Building an international community of software platform partners. *J Biomed Inform* 2019; 95:103208. PMID: 31078660.
- <sup>13</sup> Rose S. Medical student education in the time of COVID-19. *JAMA* 2020; 323(21):2131-2132. PMID: 32232420.

*Keywords: career choice, undergraduate medical education, mentorship, curriculum*

**KUSM MS2 Summer Experiences Questionnaire**

1. Age:
  - < 21
  - 21 - 25
  - 26 - 30
  - 30 - 40
  - 40+
  
2. Were you considered a Kansas Resident when you began your medical studies at KUSM?
  - Yes
  - No
  
3. What is the population of your hometown?
  - < 5,000
  - 5,000 - 10,000
  - 10,000 - 25,000
  - 25,000 - 50,000
  - 50,000 -100,000
  - > 100,000
  
4. What did you do this past summer (May-July 2021)? (Please select the one option that best fits the experience you had)?
  - STORM
  - Participation in bench/laboratory research at KUMC or another institution
  - Participation in clinical research at KUMC or another institution
  - Clinical experience in a specialty other than family medicine
  - Volunteering at a youth camp
  - Family medicine shadowing/clinical experience
  - I did not participate in a summer elective medical/research experience
  - Other (If so, please explain your experience in a few sentences)

---
  
5. How long was your summer experience?
  - Weeks
  
6. Prior to your summer experience, what was your career goal in the medical field?
  - Research-based medicine
  - Rural clinical medicine
  - Urban clinical medicine
  - Combination of clinical medicine and research-based medicine
  - Academic medicine (Teaching at least part time at a medical school or residency/fellowship program and engaging in clinical or basic science research)
  - Other (if so, please explain below)

---
  
7. Prior to your summer experience, what medical specialty were you most interested in?
  - Family medicine
  - Pediatrics
  - General Surgery or surgical subspecialty other than orthopedics
  - General Internal Medicine/Hospitalist
  - Cardiology
  - Orthopedics

- Anesthesiology
- Neurology
- Ophthalmology
- Rheumatology
- Hematology/Oncology
- Urology
- Radiology
- Nephrology
- Other (If so, please explain below)

\_\_\_\_\_

8. After your summer experience, what is your career goal in the medical field?

- Research-based medicine
- Rural clinical medicine
- Urban clinical medicine
- Combination of clinical medicine and research-based medicine
- Academic medicine
- Other (if so, please explain below)

\_\_\_\_\_

9. After your summer experience, what medical specialty are you interested in?

- Family medicine
- Pediatrics
- General Surgery or surgical subspecialty other than orthopedics
- Cardiology
- Orthopedics
- Anesthesiology
- Neurology
- Ophthalmology
- Rheumatology
- Hematology/Oncology
- Urology
- Radiology
- Nephrology
- Other (If so, please explain below)

\_\_\_\_\_

10. Do you wish you would have participated in a different summer experience?

- Yes
- No

11. Did your summer experience mentor/supervisor counsel you as to career choices?

- Yes
- No

Please respond to the statements below (12-14) using the following scale: 1) Strongly disagree; 2) Disagree; 3) Neutral; 4) Agree; 5) Strongly Agree

12. My summer experience met my expectations
13. My summer experience helped solidify my career goals
14. My summer experience made me question my career goals

Please respond to questions 15 - 22 below using the following scale: 1) Not important at all; 2) Low importance; 3) Neutral; 4) Important; 5) Very important; 6) Does not apply

When choosing your summer experience:

15. How important was receiving a stipend?
16. How important was it to work 1-on-1 with a clinician or researcher?
17. How important was it to receive school credit for the experience?
18. If a clinical experience, how important was it that the experience was rural?
19. How important was it that the experience was hands-on?
20. How important was it that you were able to choose the physician or researcher who supervised your summer experience?
21. How important was it that you were able to choose the location of your experience?
22. How important was the potential for patient interaction (ability to perform a history and physical exam)?

**Open-ended questions**

23. Please tell us more about why you picked the summer experience that you did.
  
24. What was your major take-away from your summer experience?
  
25. Do you believe that this summer experience helped you develop a better understanding of what career path you would like to pursue?  
Explain?