Medical student research at Texas Tech University Health Sciences Center: Increasing research participation with a summer research program

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Abstract

Background: *Medical student participation in research is important to increase their understanding of clinical and biomedical research. In addition, it is becoming increasingly important for medical students to have research experience for acceptance into highly competitive residency programs. In 2009, 39.7% of medical students graduating from Texas Tech University Health Sciences Center School of Medicine reported research participation. This was well below the national average of 58%, as reported in the 2009 Mission Management Tool (MMT). Therefore, our goal was to use a medical student summer research program to increase medical student participation in research to at least the national average.*

Methods: *Data from the summer research program, Association of American Medical Colleges (AAMC) MMT, and AAMC Graduate Questionnaire (GQ) were used to assess the success of the program from its initiation in 2010 until 2016.*

Results: *For the summer of 2010, a student summer research program was created. Since that time the number of medical students participating in the program has increased from 18.5% in 2010 to 51.9% in 2016. Consistently there has been an increase in the percentage of students who, at graduation, report research participation from 55.1% in 2010 to 74.5% in 2016. This is above the national average of 74.1% as reported in the 2016 AAMC GQ.*

Conclusion: *A medical student summer research program can increase student research participation.*

Keywords: *Medical student research, summer research program, medical school, research*

Introduction

Medical knowledge is one of the core competencies endorsed by the Accreditation Council for Graduate Medical Education (ACGME). Medical student participation in research is important to obtain the critical thinking skills needed to understand and apply knowledge of clinical, biomedical, epidemiological, and social-behavioral sciences necessary to practice current evidence-based medicine.[1,2] Moreover, a 2006 study of the selection criteria for residency programs found that research experience increases the chances for acceptance into the most competitive specialties.[3] In 2016, 42,370 applicants applied for 30,594 filled positions, and U.S. allopathic seniors who matched had more research experiences on average than those who did not match for all specialties except Diagnostic Radiology, Internal Medicine, and Internal Medicine/Pediatrics.[4,5] Given these important concerns, we sought to use the School of Medicine (SOM) Student Summer Research Program (SSRP) to increase medical student research participation in the SOM at Texas Tech University Health Sciences Center (TTUHSC).

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Methods

Data from the Association of American Medical Colleges (AAMC) Mission Management Tool (MMT) prepared for TTUHSC SOM from 2009 to 2016 and the AAMC Medical School Graduate Questionnaire (GQ) Individual School Report for TTUHSC SOM from 2007 to 2016 were used to assess medical student participation in research. TTUHSC SOM specific data for 2005 and 2006 were obtained from the 2007 GQ. Data for all schools for 2005 to 2008 were obtained from the GQ Program Evaluation Survey, All Schools Summary Report provided by the AAMC. The MMT provides a three-year average percentage of medical students who participated in research based on the previous three GQs, except for 2009, which reported the average for 2005-2007. The GQ reports the percentage of medical students at graduation who report participating in a research project with a faculty member during medical school. The GQ also reports the percent of medical students who reported authorship (sole or joint) on peer-reviewed oral or poster presentations and the percent of medical students who reported authorship (sole or joint) on peer-reviewed papers submitted for publication prior to graduation from medical school. Data for presentations have been collected only for 2014, 2015 and 2016.

Additional data on the total number of medical students and clinical or basic science faculty mentors participating in the SSRP were collected and provided by the Office of the Dean, TTUHSC SOM. The number of students presenting posters during the Student Research Week was obtained by comparing the list of students who participated in the SSRP with TTUHSC Student Research Week abstract books for 2011 to 2017. Additionally, the total number of SSRP students listed as authors on abstracts for the 2017 Student Research Week was collected from the 2017 TTUHSC Student Research Week abstract book.

Results

State of TTUHSC SOM student research participation in 2009

The AAMC medical school graduation questionnaire (GQ) and AAMC mission management tool (MMT) provide reliable data for a comparative assessment of various medical school missions, including research.[6] In 2009 the average participation in research by medical students at TTUHSC for 2005-2007 was 39.7% compared to 58% for the national average as reported in the 2009 MMT (Figure 1B). At the same time, 35.7, 41.7, 41.8, 47.4, and 57.1% of

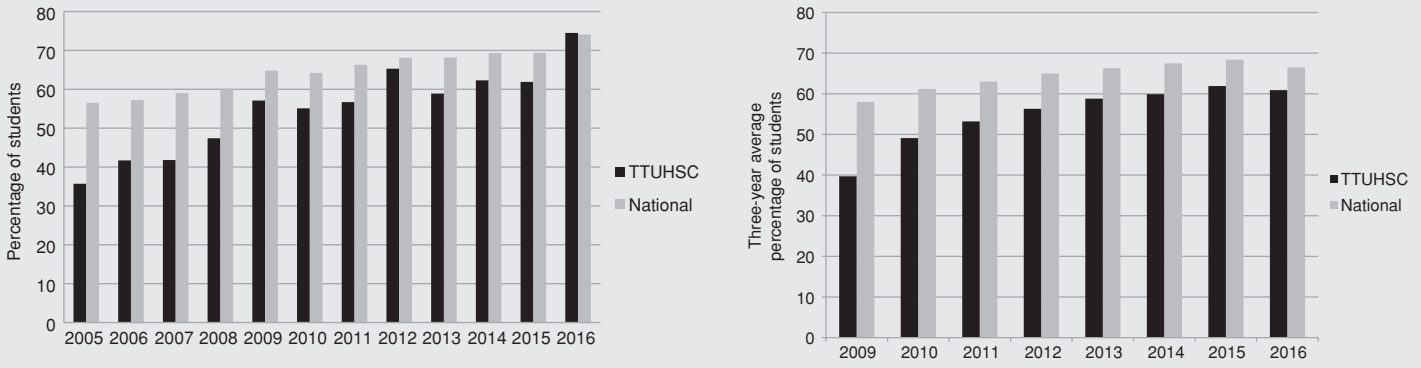

Figure 1. Medical student participation in research as reported by the AAMC medical school graduation questionnaire (GQ) and AAMC mission management tool (MMT). A) The GQ reports the percentage of medical students at graduation who report participating in a research project with a faculty member during medical school. B) The MMT reports the three-year average percentage of medical students who participated in research. The average is the percentage of medical students who reported participating in research on the previous three GQs, except for 2009, which reported the average for 2005-2007.

TTUHSC medical students reported participating in a research project with a faculty member in 2005, 2006, 2007, 2008, and 2009, respectively. This was below the national average of 56.5 to 64.8% from 2005 to 2009 as reported in the AAMC GQ (Figure 1A).

Creation of a SOM Student Summer Research Program

In response to the increased need for medical students to participate in research, the School of Medicine Student Summer Research Program (SSRP) was created in 2010.

This is an eight-week program for first-year medical students to participate in research over the summer between years 1 and 2 of medical school. It is designed to help students gain meaningful experience and knowledge in an area of research interest that contributes to their medical education. First-year medical students work with interested faculty members to develop project proposals that are to be submitted for approval to the Office of the Dean. Participants receive a stipend of $2,240 (half provided by the Office of the Dean and the other half by the faculty mentor) and are expected to present posters on their summer research activities during the Student Research Week the following spring.

In 2010 and 2011, 28 and 25 (18.5 % and 16.3 %) medical students participated in the SSRP, respectively (Figures 2 A and B). From 2012 to 2016, several

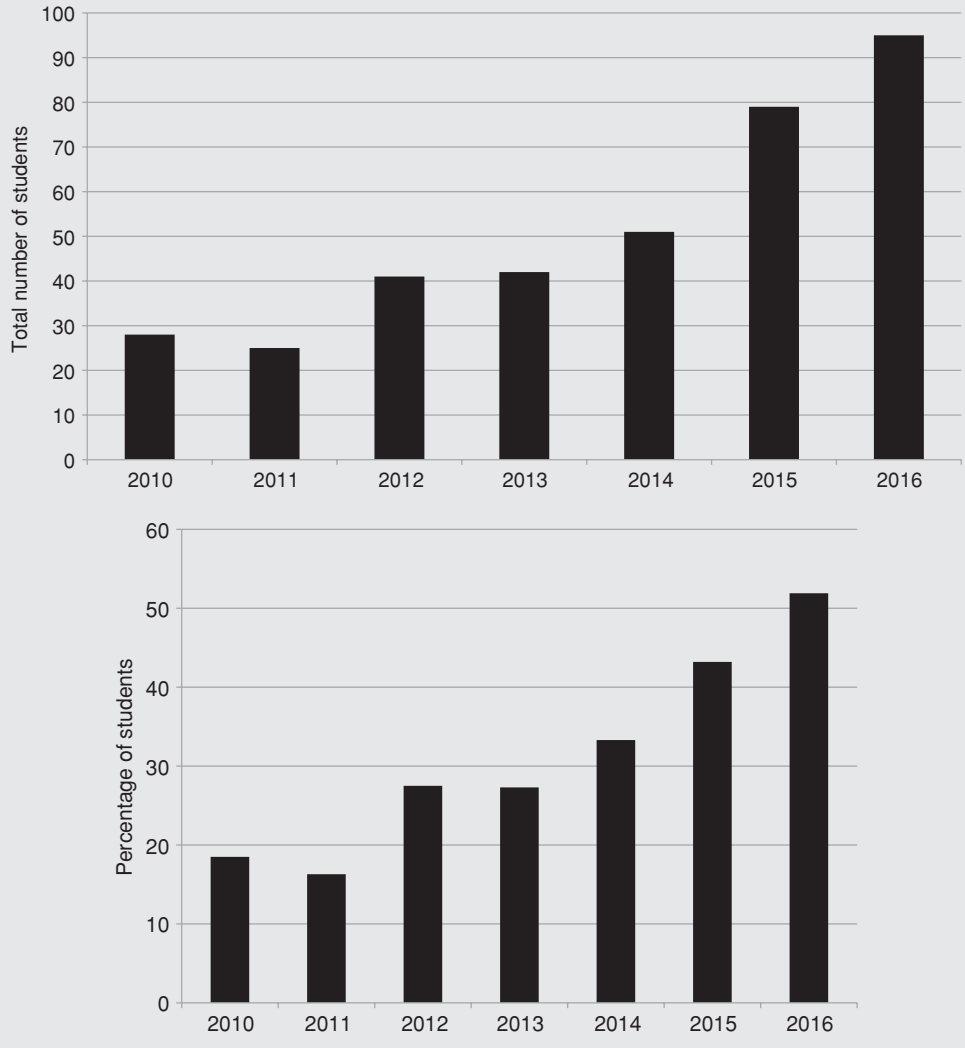

Figure 2. Medical student participation in the SOM student summer research program. A) Total number of medical students who participated in the SOM student summer research program. This program is for first year medical students during the summer before year 2 of medical school. Note from 2010 to 2014 there were approximately150 medical students in each class. This number increased to approximately180 medical students for 2015 and 2016. B) Given the increase in the number of the medical student in 2015 and 2016, the percentage of medical students (total number of students who participated in the program divided by the total number of first year medical students for each year) who participated in the SOM student summer research program is provided.

Table 1. Methods to increase student research participation

Advertising	Classroom lectures Fall and Spring, emails, Sakai, facebook.
Faculty Mentors	Present information on the program at the Basic Science Chairs, Clinical Chairs and General Faculty Meetings.
Information	Website with program information and list of available mentors and research projects, checklist with steps to find mentors and start a research project, and lunch for students to meet with potential mentors.
Surveys	Students and mentors fill out surveys at the end of the summer to identify ways to improve the program.

changes were made to encourage students to participate in research and the SSRP. These included emphasizing the importance of research, advertising the SSRP to both students and potential faculty mentors, providing information to guide students and mentors interested in participating in research, and developing surveys for students and mentors to identify additional ways to improve the program. These changes are listed in the Table. During this time, the total number of participants in the SSRP increased from 41 in 2012 to 95 in 2016 (27.5 % to 51.9%) (Figures 2A and B).

In 2016 for the first time the percent of TTUHSC medical students who reported participating in a research project with a faculty member, 74.5%, was above the national average of 74.1 % (Figure 1A). The average percentage of students reporting research participation as measured by the MMT increased to 60.9 % compared to the national average of 66.5 % (Figure 1B). This is a 1.53 fold increase from 39.7% in 2009 before the start of the program. Over the same time period, the national average increased by 1.14 fold.

Other Medical Student Research Outcomes

In addition to an increase in research participation, the number of students presenting and submitting papers has increased. One of the expectations of students who participate in the SSRP is that they generate data to present posters describing their research activities at the annual TTUHSC Student Research Week, which is held in March of the following year. The number of medical students presenting posters at the Student Research Week has increased from 19 and 17 in 2010 and 2011, respectively, to 64 participants in 2016 (Figure 3A). Even though the total numbers of students presenting posters has increased, the overall percent of students who presented posters has not changed, averaging 72.0% between 2010 and 2016 (varying from a low of 67.1% in 2015 to a high of 82.9% in 2012) (Figure 3B). At the latest Student Research Week, 67.4% of students presented posters as first authors (Figure 3B). An additional 20% of the students did not give poster presentations but were contributing co-authors, and, therefore, a total of 87.4% of the students appeared as authors on the posters. (not shown in Figures).

Consistent with the increase in students participating in the SSRP and reporting research participation at graduation in the AAMC GQ, the percent of students reporting authorship on a presentation has been at or above the national average for all three years it has been included in the AAMC GQ (Figure 4A). The percentage of students who are authors on submitted publications has increased from around 30% before 2011 to over 40% in 2015 and 2016 (Figure 4B).

An additional benefit of the program is the increase in the number of faculty mentors. There was an increase in total mentors from 23 in 2010 to 53 in 2016 (Figure 5). This number varied from a low of 21 mentors in 2011 to a high of 54 mentors in 2015. At the same time, the number of basic science mentors ranged from 12 in 2011 and 2012 to 22 or 21 in 2015 and 2016, respectively. The increase in the number of clinical mentors was especially encouraging from a low of 10 or 9 in 2010 or 2011, respectively, to a high of 32 in 2015 and 2016.

Discussion

By creating a medical student summer research program, we have increased the number of medical students participating in research at TTUHSC. In fact,

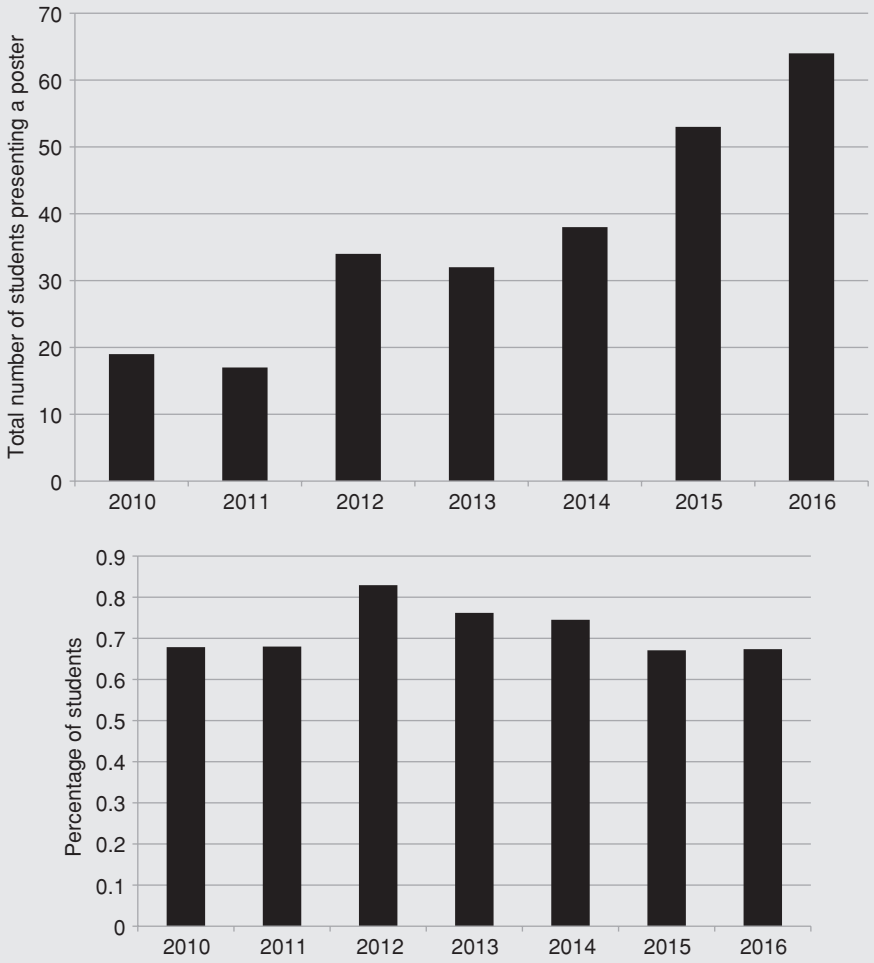

Figure 3. TTUHSC Student Research Week poster presentations* A) Total number of medical students who participated in the SSRP and presented a poster at TTUHSC Student Research Week. B) Percentage of medical students who participated in the SSRP and presented a poster at TTUHSC Student Research Week. *Note the year on the x-axis is the year the student participated in the SSRP. Posters were presented at the annual TTUHSC Student Research Week the following spring. For example, students who participated in the SSRP during the summer of 2016 presented their posters at the 2017 TTUHSC Student Research Week.

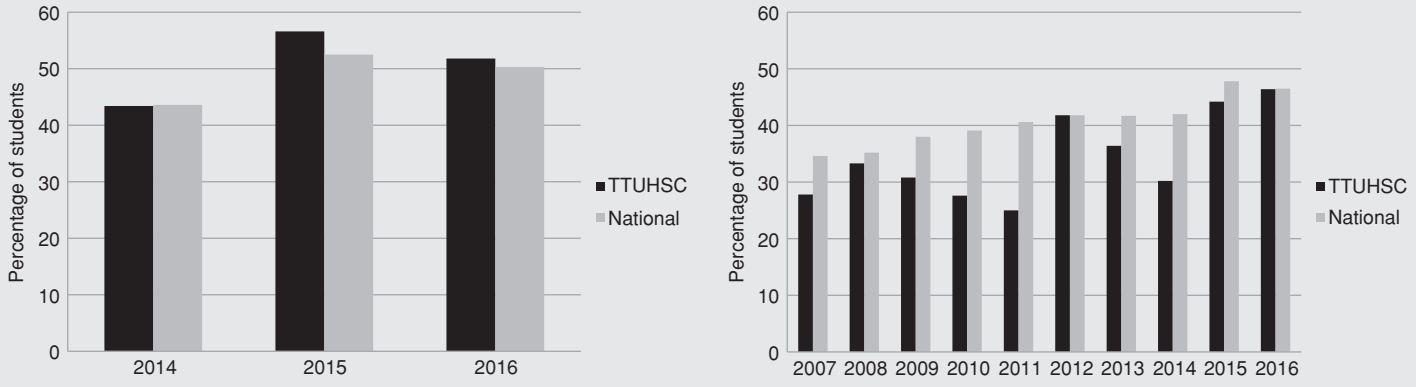

Figure 4. AAMC GQ reporting of student presentations and publications. A) The percent of medical students who reported authorship on a peer-reviewed oral or poster presentation. B) The percent of medical students who reported authorship on a peer-reviewed paper submitted for publication prior to graduation from medical school.

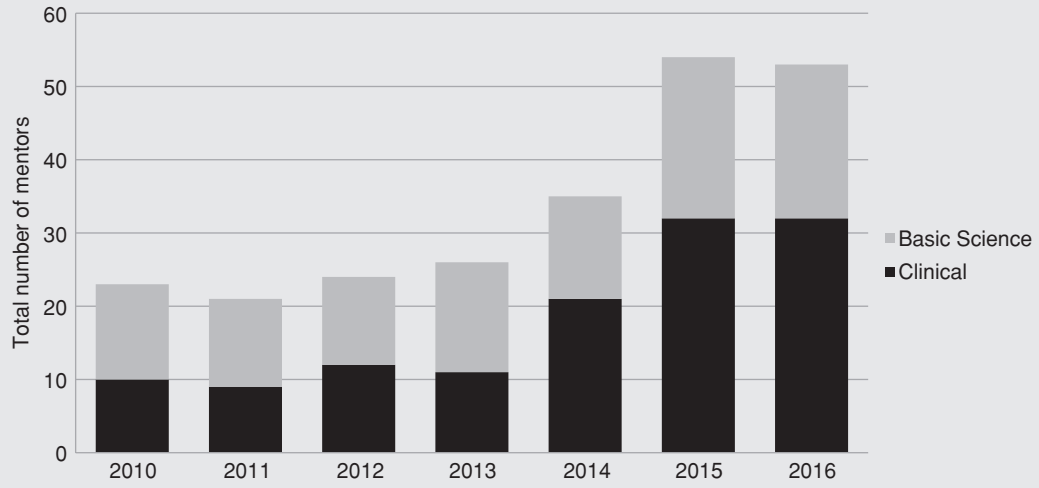

Figure 5. Faculty mentors for students participating in the SSRP. The total number of faculty mentors between 2010 and 2016 are graphed. The bars are further divided into total clinical and basic science mentors as indicated by the black and grey bars, respectively.

the percentage of students at graduation who report participating in research has increased to just above the national average. This is especially remarkable considering that several other medical schools included in the national average results require their students to participate in research, while research participation at TTUHSC SOM is voluntary. In a 2012-2013 survey by the LCME 49 of 136 (36%) of medical schools indicated that they have a research requirement for their medical students.[7]

Thus far there has been a continued steady increase in the number and percentage of students participating in the summer research program. Given the lag time between the summer research program, which occurs between the first and second years of medical school, and when students fill out the GQ at graduation, we anticipate a continued increase in the percentage of students who report research participation on the GQ. Nevertheless, we will still need to monitor the number of students participating in the program to sustain this increase in participation and maintain the success of our SSRP.

Simply creating a student research program may not be enough as the number of students who initially participated in our program was low, below 20% in 2010 and 2011. In order to increase participation, we had to make sure that the students were aware of both the program and the importance of gaining research experience. This was accomplished with several approaches, including advertising to the students in class and online and developing a website with information on the program as listed in the Table.

In the near future we will develop a research elective for students who participate in the SSRP and meet certain expectations. We also plan to develop a research track, research honors, and/or a certificate program and work with our Clinical Research Institute and Faculty Development Offices to provide training and/or workshops for faculty and students to continue to improve the program. Overall, we have seen growth in medical student participation in research, and we expect continued growth.

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