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Comprehensive Medical College Admission Test Preparatory Course as a Strategy to Encourage Premedical Students to Pursue Osteopathic Medicine in Rural Areas

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Context: Comprehensive Medical College Admission Test (MCAT) preparatory courses could potentially promote interest among premedical students to pursue careers in osteopathic medicine in underserved areas.

Objective: To determine whether a comprehensive 16-week course centered on MCAT preparation and exposure to an osteopathic medical school setting will promote interest among premedical students to become osteopathic physicians in the rural Southwest.

Methods: At the Burrell College of Osteopathic Medicine in Las Cruces, New Mexico, undergraduate premedical students from the surrounding rural and urban areas completed an all-inclusive 16-week MCAT preparation course. Students were required to have completed medical school prerequisite courses and have a minimum 3.0 grade point average. The program included interactive instructional sessions for teaching material pertinent to the MCAT, an introduction to osteopathic philosophy, workshops for application preparation, a tour of the medical school facilities, full-length practice tests, and mock interviews. After course completion with at least 80% attendance, a survey was conducted to identify effectiveness and outcomes of the course. The survey used a Likert scale that ranged from 1 (strongly disagree) to 5 (strongly agree).

Results: Of the 170 student participants, 163 completed the survey. After completing the course, participants felt more knowledgeable about the true nature of medical school and osteopathic medicine (weighted averages, 4.26-4.40) than before the course. Compared with attitudes before taking the course, participants were more inclined to attend an osteopathic medical school and practice rural medicine in the southwestern United States (weighted averages, 4.16-4.45). Participants who completed the course also felt that they were better prepared to take the MCAT (weighted average, 4.37).

Conclusion: Participant knowledge and attitudes about practicing osteopathic medicine were enhanced after they completed the comprehensive MCAT preparatory course. These results suggest that offering similar courses in osteopathic medical schools throughout the country may improve the outlook of creating a diverse physician workforce that provides health care in rural areas.

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The United States is projected to have a shortage of as many as 104,900 physicians by the year 2030,¹ with the greatest physician shortage occurring in rural areas.² Therefore, the need to generate qualified medical school applicants willing to establish practices in underserved areas is greater than ever. Studies have shown that students from rural areas are far more likely to practice medicine in rural settings than their urban counterparts.³ However, in-person educational opportunities available to individuals residing in rural areas are often limited because of inaccessibility to educational establishments or socioeconomic challenges.⁴ A cursory glance online of onsite commercial Medical College Admission Test (MCAT) preparatory courses shows that prices for these courses can be prohibitive, ranging from approximately \$2300 to \$9500. Even if individuals were able to attend and afford one of these courses, there is no guarantee of success.⁵ The questionable efficacy of these courses could be due to lack of a more complete medical school experience that includes adequate student engagement combined with a robust structure, access to a mentor or advisor, and sufficient preparation time.⁶

While programs that provide training for the MCAT are an important component of preparing future medical students, other programs have been developed that are designed to increase interest in practicing osteopathic medicine. Increasing interest in practicing osteopathic medicine is important because osteopathic medical schools emphasize the practice of primary care medicine, often in underserved settings. In one study⁷ conducted at the Oklahoma State University Center for Health Sciences, a diverse population of area high school students was exposed to osteopathic medicine. Participants gained an increased interest in science, technology, engineering, and mathematics (STEM) careers during the 6-week long biomedical research internship.⁷ Additionally, a 2018 study by Atance et al⁸ demonstrated that interest in careers and health care sciences increased in high school students who participated in a week-long enrichment program.

A program offered at the West Virginia School of Osteopathic Medicine showed that a 1-day mini medical school program was able to promote interest among high school students toward pursuing a career in osteopathic medicine.⁹

However, these studies focused on high school students who may not have solidified the career path that they will necessarily follow. Other similarly focused programs offered to undergraduate students may have a greater impact on participants who are on the cusp of embarking on specific career paths. Numerous programs are carried out by a variety of medical schools around the United States, but, to our knowledge, they are abbreviated programs that focus on MCAT preparation and do not provide an experience that will draw them into rural primary care. Moreover, few osteopathic medical schools offer such programs even though osteopathic medical schools are known for producing physicians, particularly primary care physicians, who gravitate toward medical practices in underserved areas of the United States.^{10,11}

In consideration of all these factors, we chose to assemble a 16-week comprehensive course that provides undergraduate students with MCAT preparation, workshop training for writing medical school applications and being interviewed, and general experience for what life in an osteopathic medical school is like.

The mission of the Burrell College of Osteopathic Medicine (BCOM) at New Mexico State University in Las Cruces, which admitted its inaugural class in August 2016, is to improve the health of the southwestern United States by increasing the number of physicians practicing in the region while increasing diversity in the physician workforce.¹² Las Cruces, a medium-sized city of approximately 100,000, lies in a predominately rural region 48 miles from the US-Mexico border with a nearly 60% minority population. Therefore, to meet the stated mission, BCOM offered this comprehensive MCAT preparatory course in spring 2017 (free of charge) and 2018 (\$100.00).

The objective of this study was to gauge the attitudes of course participants regarding their desire to attend an osteopathic medical school and practice medicine, particularly rural medicine, in the region.

Methods

This survey-based study used a nonexperimental design with a convenience sample of premedical students who completed a 16-week MCAT preparation course hosted on the BCOM campus. The study was conducted after receiving approval from BCOM's institutional review board.

Study Population

Premedical students who were preparing for the MCAT were recruited through premedical advisors and student organizations at various undergraduate institutions. The students were from Las Cruces, New Mexico, and the surrounding regions, including both rural and urban areas, and enrolled in school at New Mexico State University, University of Texas at El Paso, and other colleges in the geographic region. Registration for the course included required completion of an enrollment form in which personal data comprising name, date of birth, sex, race/ethnicity, current place of residence, and prior coursework were collected. To be eligible for the course, completion of prerequisite work in chemistry, biology, and physics with a minimum 3.0 grade point average on a 4.0 scale was required. The enrollment form also contained several questions designed to gauge motivation of the participants for taking the course and commitment to attendance. A question inquiring about passion for pursuing a DO or MD degree was also included to assess interest in a career in medicine.

Course

The course delivered more than 112 hours of in-class lectures focused on high-yield topics covered on the MCAT as outlined by the American Association of Medical Colleges. Multiple workshops were included

to familiarize participants with osteopathic principles and practice. To accommodate class and work schedules, 2 one-and-a-half hour evening class sessions and 1 four-hour Saturday session took place at BCOM each week.

The MCAT instructional sessions followed the American Association of Medical Colleges syllabus, and all materials and recordings of lectures were loaded into the learning management system, Canvas, so that participants could access them at any time during the course. The 4 MCAT sections (Biological and Biochemical Foundations of Living Systems; Chemical and Physical Foundations of Biological Systems; Psychological, Social, and Biological Foundations of Behavior; and Critical Analysis and Reasoning Skills) were taught by discipline experts from BCOM as well as other local university faculty. Four full-length MCAT practice examinations were administered throughout the course to help students improve test-taking skills. Additionally, supplemental workshops taught by BCOM osteopathic faculty exposed students to the medical school via tours of the facility, as well as the profession, tenets, and philosophy of osteopathic medicine. The admissions team at BCOM conducted a workshop explaining the admissions process, and students had the opportunity to ask questions.

Further workshops guided students through the process of writing a personal statement, had students participate in mock interviews to receive constructive feedback on their interview skills, and allowed students to participate in the "DO for a Day" program sponsored by the Department of Student Affairs at BCOM. All participants were mentored by a first-year osteopathic medical student for the duration of the course.

Survey

Participants from the cohort for each year were asked to complete a 6-item survey via SurveyMonkey after completion of the course. To protect participants' identities, they were emailed the link to the survey, which they could complete anonymously. A title page containing a consent form was followed by the survey questions.

All questions used a Likert scale, with 1 indicating “strongly disagree” and 5 indicating “strongly agree.” The first 2 questions were intended to evaluate participants’ perception of the course with respect to preparing them for the MCAT and for the rigors of medical school. The next 2 questions assessed participants’ change in knowledge level about osteopathic medicine and whether they were more or less likely to practice osteopathic medicine compared with the beginning of the course. The final 2 questions evaluated whether the course had any effect on the participants’ likelihood to practice medicine in the southwest region of the United States and/or to practice rural medicine. Monthly reminders were sent to the students until at least 95% had responded.

Data Collection and Analysis

Once the questionnaires were completed, percentages for responses to each question were calculated and a weighted average out of 5.0 for each question was determined. Although an overall response rate of 163 out of 170 was obtained, full compliance was not achieved on the 163 completed questionnaires because a small number of the questions were left unanswered, which led to minor anomalies in the data reporting. Upon completion of the course, participants were invited to share their MCAT results and acceptances to medical school via email with the primary investigators. However, the participants were not in a controlled setting after they completed the course, and this rendered collection of these data sporadic. Therefore, occasional allusions to these data in this work should be deemed anecdotal. Descriptive statistics including frequency and weighted average were used to analyze demographic variables including ethnicity, gender, and size of city each participant was from, as well as the results from the survey.

Results

Of the 170 students who completed the course, 163 (95.9%) completed the survey. Demographic data collected from course participants included gender and

ethnicity, with 118 (69.4%) reporting gender as female and 137 (80.6%) reporting Hispanic ethnicity (Table 1). Despite the majority of the respondents (96 [56.5%]) being from cities with populations of 500,000 or more, there was a substantial number of participants (74 [43.5%]) from smaller cities of 100,000 or less, demonstrating successful outreach to students from underserved communities (Table 1).

The majority of participants (137 of 161 [85.1%]) agreed or strongly agreed that their knowledge of osteopathic medicine was enhanced after the course (weighted average 4.40; Table 2). The majority (128 of 163 [78.5%]) also agreed or strongly agreed that they were more likely to apply to osteopathic medical schools (weighted average, 4.26) and that if they became physicians, they would be more likely to practice medicine in the Southwest (140 of 163 [85.9%]) and/or practice rural medicine (124 of 163 [76.1%]) (weighted average, 4.16) (Table 2).

Most students (146 of 163 [89.6%]) felt more confident in their ability to perform well on the MCAT (weighted average, 4.37). Thirty-four 2017 course

Table 1.
Demographic Information of Participants in Medical College Admission Test Preparatory Course (N=163)

Characteristic	No. (%)
Gender	
Male	52 (30.6)
Female	118 (69.4)
Race/Ethnicity	
Asian	10 (6.1)
White	17 (10.0)
Black	6 (3.7)
Hispanic	137 (84.0)
City Size by Population	
≤50,000	22 (13.5)
50,000-100,000	1 (0.6)
Approximately 100,000	51 (30.0)
>500,000	96 (58.9)

Table 2.
Survey Results of Premedical Students Enrolled in the Comprehensive MCAT Course at the Burrell College of Osteopathic Medicine (N=163)^a

Survey Item	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree	Weighted Average
Compared to my knowledge before the course, I feel more knowledgeable about what medical school is truly like.	3 (1.8%)	3 (1.8%)	11 (6.8%)	59 (36.2%)	87 (53.4%)	4.37
Compared to my knowledge before the course, I feel more knowledgeable about osteopathic medicine.	4 (2.5%)	3 (1.8%)	17 (10.5%)	37 (23.0%)	100 (62.1%)	4.40
Compared to how I felt before the course, I am more likely to apply to osteopathic medical schools.	4 (2.5%)	6 (3.7%)	25 (15.3%)	37 (22.7%)	91 (55.8%)	4.26
Compared to how I felt before the course, I am more likely to practice medicine in the southwest United States if I become a physician.	3 (1.8%)	1 (0.6%)	19 (11.7%)	37 (22.7%)	103 (63.2%)	4.45
Compared to how I felt before the course, I am more likely to practice rural medicine if I become a physician.	4 (2.5%)	5 (3.1%)	30 (18.4%)	46 (28.2%)	78 (47.9%)	4.16
Compared to how I felt before the course, I feel/felt more confident in my ability to perform well on the MCAT.	3 (1.8%)	3 (1.8%)	11 (6.8%)	59 (36.2%)	87 (53.4%)	4.37

^a Data are given as No. (%). For the second item, 161 participants responded.

Abbreviation: MCAT, Medical College Admission Test.

participants (53%) reported taking the MCAT and shared their scores. Of these, 21 (61.8%) scored at or above the national average of 500 (scale, 472-528), with 1 who scored 521 (98th percentile).

The rate of reporting on medical school acceptance has been sparse; we are aware of only 9 acceptances to osteopathic medical schools. Data collection is ongoing for both the 2017 and 2018 course participants.

Discussion

The comprehensive MCAT course offered by BCOM was designed to simultaneously help premedical students in the region gain entry into medical school and increase their interest in practicing osteopathic medicine, possibly in the rural Southwest. We provided an all-encompassing experience consisting of MCAT

preparation, medical school application and interviews, and exposure to osteopathic medical school life.

In fulfillment of BCOM's mission, the course was made accessible to a population of students largely from rural communities around Las Cruces. Opportunities such as our onsite course are not typically available to premedical students in this area. Moreover, where there is availability, the cost of such opportunities are often prohibitive, so we offered our course free of charge the first year and for \$100 the second year.

It was not by design, but the fact that females greatly outnumbered males is significant because women remain largely underrepresented among physicians, especially in specialties such as orthopedics. Yet, male and female applicants to medical school and trainees in many medical specialties are nearly equal.¹³ Of greater consequence, perhaps, is the high percentage of

Hispanic participants. Hispanic applicants comprise only 6.3% of applicants to US medical schools.¹⁴ This statistic translates to gross underrepresentation in the physician workforce for this group. We hope to greatly augment diversity within the physician workforce in the arenas of gender and Hispanic ethnicity, thereby offering greater social justice and decreased health disparities in the region. Greater physician diversity may be especially consequential because it may lead to improved public health.¹⁵⁻¹⁷

Because the MCAT serves as the gateway into medical school, it was also imperative that the students be well prepared for this difficult examination. The combination of teaching that covered the full spectrum of MCAT content by experts that included medical school faculty and the opportunity to practice with 4 full-length examinations boosted the participants' confidence in taking the MCAT (weighted average, 4.37).

One limitation of this study is the ability to collect data on MCAT score results and admission to medical school. Participants who do not score well on the MCAT and do not matriculate to a medical school may be less inclined to share these data. Nevertheless, we will continue to communicate with participants to glean as much data as possible. Furthermore, we would like to track the career pathways of individuals who participate in the course to determine the true long-term impact of the course with respect to medical school admissions followed by practice of medicine in the region and in rural areas.

This course provides an excellent platform for pre-medical students to experience osteopathic medical school. We believe these kinds of outreach courses can have a 3-fold benefit: (1) furthering the careers of individuals who participated in the course; (2) increasing the osteopathic physician workforce; and (3) serving rural and underserved communities.

Conclusion

A comprehensive 16-week MCAT preparatory course is effective at stimulating interest among premedical stu-

dents toward a career in osteopathic medicine, including in rural areas. The results of our research indicate that targeting premedical students who are minorities or from underserved communities with a course of this nature promotes interest in practicing osteopathic medicine in areas with rural or underserved populations. The interest in practicing in areas with rural and underserved populations is especially relevant in the context of our MCAT preparatory course since the majority of participants were female or Hispanic students, both of which are underrepresented in the physician workforce. Therefore, we feel that the effects of our course could be far-reaching with respect to promoting a diverse physician population in rural areas. Ongoing monitoring will be required to fully know the extent. We believe that if every osteopathic medical school were to offer similar courses, the courses would have a large impact on reducing the physician shortage in rural and/or underserved parts of the country.

Author Contributions

All authors provided substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data; Drs Shipley and Kadavakollu drafted the article or revised it critically for important intellectual content; Drs Shipley and Kadavakollu gave final approval of the version of the article to be published; and all authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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