


A Student Survey: Influence of Emergency Medical Technician Training on Student's Application, Matriculation, and Transition into Medical School

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Purpose: Medical education seeks to develop active methods of learning in addition to skills for patient interaction. With this in mind, the University of South Carolina (UofSC) School of Medicine Greenville developed a curriculum with an integrated emergency medical technician (EMT) certification course designed to provide a meaningful clinical experience for students; however, no data exists on whether this type of course influences a student's decision to apply to or attend a medical school and how such a course affects the transition to the medical school environment. The purpose of this study was to determine if an EMT course, as part of the medical school curriculum, influences students' decision to apply and attend a particular medical school and if this course influences students' transition to medical school while providing awareness of patients' lives and circumstances.

Methods: A voluntary anonymous survey was distributed in Spring 2019 to first-, second-, third-, and fourth- year medical students at the UofSC School of Medicine Greenville. Response rates were 68.5%, 66.3%, 55.2%, and 56.9%, respectively.

Results: Forty-three percent of students agreed/strongly agreed that the EMT course at UofSC School of Medicine Greenville factored into their decision to apply while 52% of students agreed/strongly agreed that it factored into their decision to attend. Students agreed/strongly agreed (82%) that the program helped with medical school transition. Ninety-one percent of students reported that EMT experiences increased awareness of patients' lives and circumstances.

Conclusion: Students felt an EMT certification course at the beginning of the first year helped with the transition to medical school and increased awareness of patients' lives and circumstances.

Keywords: medical school curriculum development

Introduction

Medical schools are responsible for developing their own unique curriculum for training future physicians based on the overall education objectives for that program. With that said, recent recommendations to medical education include early clinical experiences that will help connect knowledge with experience.¹ It is unclear how these early clinical experiences and, to a greater extent, each school's unique curricula influence a student's decision to apply to or attend a particular medical school. While the data is limited, some reasons students may select a particular school include academic reputation, curriculum, selection procedures, and location.^{2–5}

Once a student completes the application process and is accepted, they often face many challenges with the transition to the medical school environment. Being subjected to large volumes of biomedical and clinical information in a short time frame, coupled with the development or alteration of time-management skills are some of the reported challenges expressed by medical students.^{6,7} Additional factors may include the stress involved with a school's location or meeting and forming relationships with new classmates. Various programs and experiences to facilitate this transition have been reported^{8–12} with one report showing that working clinically prior to matriculation helps through improved time

management skills and ability to better interact with patients.¹⁰ One voluntary online pre-matriculation program at Des Moines University College of Osteopathic medicine noted that students had gained an ability to apply what they learned and to take responsibility for their learning by using didactic review materials in biochemistry and physiology prior to entrance.⁸ A summer enrichment pre-matriculation program targeting students that may be at a disadvantage provided didactic and laboratory sessions in cell biology, biochemistry, gross anatomy, histology, and physiology. Students thought that it made the overall transition to medical school easier and helped with making friends and gaining confidence.⁹ While these programs assist with the transition process, they are not a component of the curriculum and are optional and often target a certain population.^{8,9,12–14}

The University of South Carolina (UofSC) School of Medicine Greenville introduced an emergency medical technician (EMT) course at the beginning of the first semester of medical school^{15,16} as a means to provide an innovative method for early clinical exposure and to help connect knowledge with experience. Emergency medical technician coursework was reported to be integrated into medical education curricula in the late 1960s,¹⁷ 1970s, and early 1980s;^{18–20} however, little was reported on this until recently.^{14,15,21–23} The EMT course is required and serves as the introductory course in the curriculum. It provides students with an opportunity to work in groups and form collaborative relationships while providing training that would introduce an environment where their future patients live and work. Each student is required to complete the National Registry of Emergency Medical Technicians (NREMT) exam as part of the requirements for successful completion. The EMT curriculum also requires an ongoing longitudinal experience in which students continue to ride on ambulances during the remainder of their first year and throughout their second year prior to entering their clerkship rotations.

As medical schools develop innovative curricula to address the recent recommendations by the Carnegie Foundation for the Advancement of Teaching to include early clinical experience that will help connect knowledge with experience,¹ it is unclear how each school's curricula influence a student's decision to apply to or attend a particular school and whether any training prior to biomedical science coursework helps with the transition to medical school. The purpose of this study was to determine if an EMT course, as part of the medical school curriculum, influences a student's decision to apply and attend medical school and if this course influences their transition.

Methods

Medical students at the UofSC School of Medicine Greenville complete an EMT course and EMT shifts during the first two years as previously described.¹⁶ A stand-alone course is administered during the first seven weeks prior to any biomedical science coursework. The course has approximately two hundred and twenty-one course hours with the following modules: preparatory, airway management, patient assessment, medical emergencies, traumatic emergencies, obstetrics and pediatrics, and operations. In addition, the course contains twenty-four hours of ambulance field exposure and ten required patient encounters. During the remainder of the first year and during the second year, students complete a total of six 12-hour emergency medical services (EMS) shifts during the Integrated Practice of Medicine 1 and 2 courses (Figure 1).^{15,16}

Survey Methods

The study design was a cross-sectional descriptive survey using a questionnaire. First through fourth year medical students enrolled at the UofSC School of Medicine Greenville were sent an email asking if they would complete a voluntary anonymous survey hosted by SurveyMonkey®. The four statements presented to students were: 1) The Emergency Medical Technician (EMT) program taught at the University of South Carolina School of Medicine Greenville (UofSCSOMG) factored into my decision to apply to medical school at the UofSCSOMG. 2) The EMT program taught at the UofSCSOMG factored into my decision to attend medical school at the UofSCSOMG. 3) The coursework for the EMT program taught at the UofSCSOMG helped with my transition into medical school. 4) My clinical experiences through the EMT program at the UofSCSOMG increased my awareness of patients' lives and circumstances. Response options for each question were: strongly disagree, disagree, neutral, agree, and strongly agree. The survey was distributed to 108 first year, 104 second year, 105 third year, and 102 fourth year students. The timing of the initial email was towards the end or soon after completion of their respective year. A reminder email was also sent

UofSC School of Medicine Greenville Pre-Clerkship Curriculum

	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June
YEAR ONE		Orientation	Integrated Practice of Medicine (IPM) 1										Vacation
			EMT Course	Molecular and Cellular Foundations of Medicine	Structure and Function of the Human Body 1	Vacation	Structure and Function of the Human Body 2	Spring Break	Neuroscience	Defenses and Responses	IPM Exams		

	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	June
YEAR TWO	Vacation	IPM 2									USMLE® Step 1 Preparation and Examination	Year 3: Start Clerkships	
		Biomedical Principles of Disease and Therapy	Heme/ Onc	Mind, Brain and Behavior	Cardiovascular / Pulmonary / Renal	IPM Exams	Vacation	GI / Hepatic	Endocrine and Reproductive	Musculoskeletal / Dermatology / Rheumatology			IPM Exams

Figure 1 Schematic representation of the first two years of medical school at the UofSC School of Medicine Greenville. EMT course = course students take that includes core components of the EMT curriculum. IPM course is the course where students complete monthly EMS shifts while completing biomedical science coursework.

Abbreviations: EMT, emergency medical technician; IPM, Integrated Practice of Medicine course.

eight and twenty days following the initial survey distribution. The survey was closed twenty-eight days following the initial email for all years.

Statistical Analysis

Cronbach's alpha was performed to determine the reliability of the survey. A Pearson correlation coefficient was performed to determine validity of the survey statements. A test of normality (ie Kolmogorov–Smirnov and Shapiro–Wilk) was completed for each question in the survey to determine if the data were distributed normally. Results of the test for normality showed the data for each question was not normally distributed. Therefore, to determine if there were between group differences for each question (ie M1, M2, M3, and M4) a one-way ANOVA (ie Kruskal–Wallis test) was performed with a Bonferroni post hoc test.

Ethical Approval

This study was reviewed and exempted by the University of South Carolina Institutional Review Board (IRB) with a cooperative review by the Greenville Health System IRB based on researcher affiliations.

Results

Overall student response rates were 73–74 (68–69%) for students in their first year, 69 (66%) in the second year, 58 (55%) in their third year, and 58 (57%) in their fourth year. [Table 1](#) depicts the number of responses by year in school, gender, age, and ethnicity.

Cronbach's alpha for the survey was 0.721 which indicates there is an adequate level of reliability for the survey. Each statement was correlated with all other statements, as determined by Pearson correlation. Correlation results are as follows: statement 1 and all other statements is $r(257) = 0.818$, $p < 0.001$, statement 2 and all other statements is $r(257) = 0.865$, $p < 0.001$, statement 3 and all other statements is $r(257) = 0.654$, $p < 0.001$, and statement 4 and all other statements is $r(257) = 0.582$, $p < 0.001$.

[Table 2](#) depicts the mean responses for each survey question for each year in medical school. There were differences between groups (ie student year in medical school) except for the statement that the EMT program increase awareness of patient's lives and circumstances.

Table 1 Number of Students Responding to Survey for Year in School, Gender, Age, and Ethnicity

	Year in School				Total
	First Year (M1)	Second Year (M2)	Third Year (M3)	Fourth Year (M4)	
*Total	74 (69)	69 (66)	58 (55)	58 (57)	259 (62)
Gender					
Male	25 (34)	30 (43)	28 (48)	25 (43)	108 (42)
Female	49 (66)	39 (57)	30 (52)	32 (55)	150 (58)
Age					
<25	58 (78)	59 (86)	45 (78)	47 (81)	209 (81)
≥25	15 (24)	9 (13)	13 (22)	9 (16)	46 (19)
Ethnicity					
White, Non-Hispanic	54 (73)	60 (87)	52 (90)	47 (81)	213 (82)
Black or African American	11 (15)	4 (6)	0 (0)	2 (3)	17 (7)
Hispanic, Latino, or Spanish Origin	0 (0)	1 (1)	3 (5)	2 (3)	6 (2)
Asian or Asian American	6 (8)	2 (3)	2 (3)	5 (9)	15 (6)
Other	3 (4)	2 (3)	1 (2)	1 (2)	7 (3)

Notes: *Differences in numbers between total and subgroups are due to some students not answering every statement. Number (Percent of students responding).

Table 2 Mean Response Values for Survey Statements

	Year in School				Total
	First Year (M1)	Second Year (M2)	Third Year (M3)	Fourth Year (M4)	
Number of students	73 (74***)	69	58	58	258
The Emergency Medical Technician (EMT) program taught at the University of South Carolina School of Medicine Greenville (UofSCSOMG) factored into my decision to apply to medical school at the UofSCSOMG.	3.55 (1.07)*,**	3.33 (1.11)	2.81 (1.18)	2.90 (1.28)	
The EMT program taught at the UofSCSOMG factored into my decision to attend medical school at the UofSCSOMG.	3.66 (1.06) [†]	3.54 (1.04)	3.05 (1.16)	3.24 (1.22)	
The coursework for the EMT program taught at the UofSCSOMG helped with my transition into medical school.	4.23 (0.87)	4.35 (0.87) [‡]	3.98 (1.05)	3.90 (1.07)	
My clinical experiences through the EMT program at the UofSCSOMG increased my awareness of patients' lives and circumstances.	4.37 (0.96)	4.51 (0.70)	4.50 (0.73)	4.47 (0.68)	

Notes: Results are reported as mean score (standard deviation) of Likert scale responses. Likert scale response options for each question were: strongly disagree, disagree, neutral, agree, and strongly agree. ***Number of students for first 3 statements above was 73 with the number of students responding to question 4 being 74. P values are reported as adjusted significance values after the Bonferroni correction. *p=0.004 compared to M3 students. **p=0.022 compared to M4 students. [†]p=0.026 compared to M3 students. [‡]p=0.038 compared to M4 students.

Figures 2–5 depict total responses and responses by year in school for each of the four statements. Forty-three percent of respondents agreed or strongly agreed that the EMT program factored into their decision to apply to medical school at the UofSC School of Medicine Greenville (Figure 2A). When separated by year in school, first and second year students

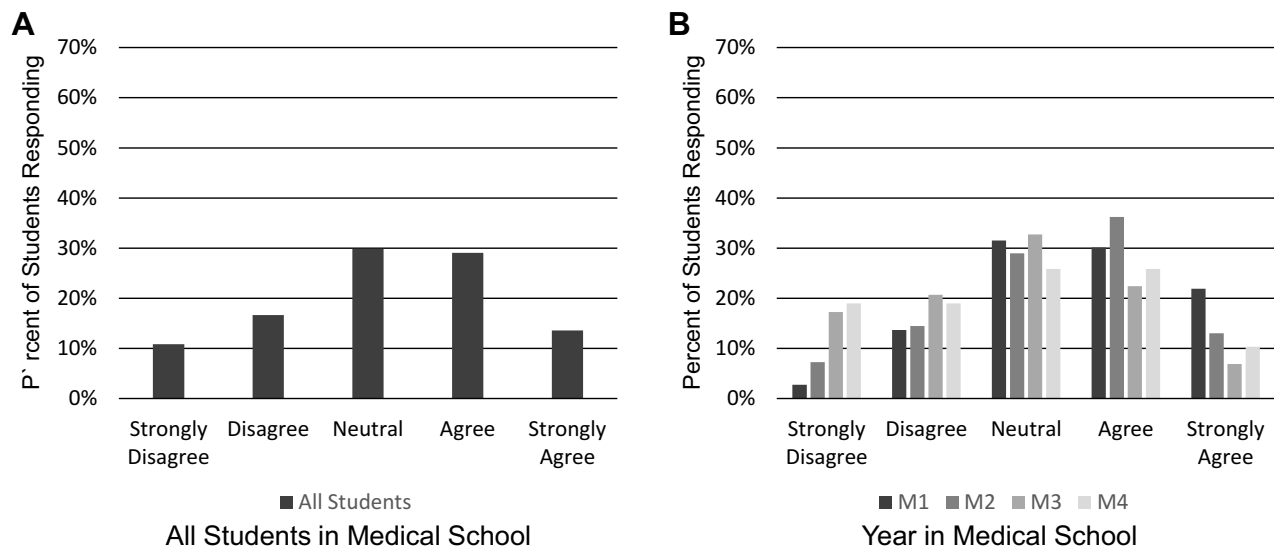


Figure 2 EMT program factored into my decision to apply to UofSC School of Medicine Greenville. Student responses to the EMT program factoring into their decision to apply to medical school. Likert Scale descriptors: Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree. **(A)** All students in medical school combined. N=259. **(B)** Student responses by year in medical school. M1: N=73; M2: N=69; M3: N=58; M4: N=58.

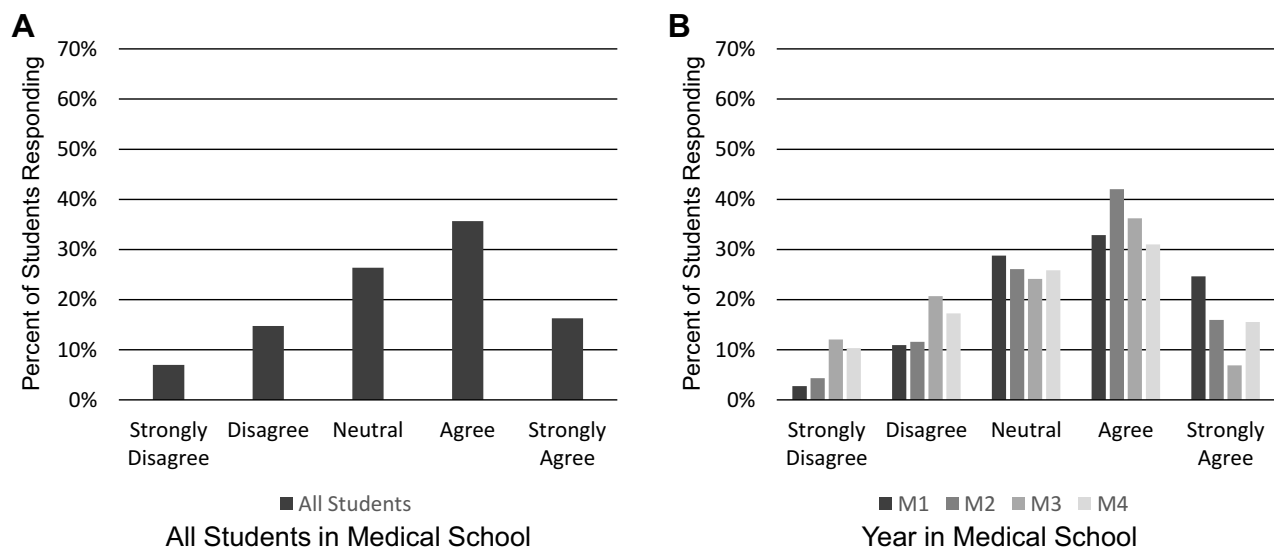


Figure 3 EMT program factored into my decision to attend UofSC School of Medicine Greenville. Student responses to the EMT program factoring into their decision to attend medical school. Likert Scale descriptors: Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree. **(A)** All students in medical school combined. N=259. **(B)** Student responses by year in medical school. M1: N=73; M2: N=69; M3: N=58; M4: N=58.

agreed and strongly agreed more than third- and fourth-year students that the EMT program factored into their decision to apply (Figure 2B).

Fifty-two percent of students agreed or strongly agreed that the program factored into their decision to attend the UofSC School of Medicine Greenville (Figure 3A). When separated by year in school, first and second year students agreed and strongly agreed more than third- and fourth-year students that the EMT program factored into their decision to attend to the school (Figures 3B).

Eighty-two percent of students agreed or strongly agreed that the EMT program helped with their transition into medical school (Figure 4A). Results separated by year in school were similar (Figures 4B).

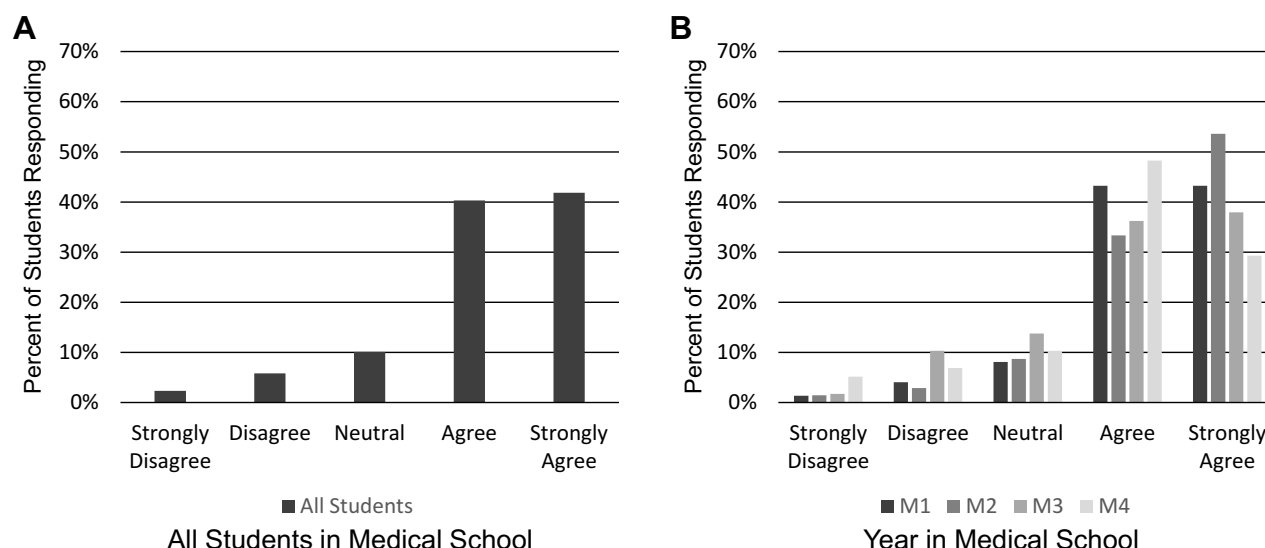


Figure 4 The coursework for the EMT program helped with my transition to medical school. Student responses to the EMT program helping with their transition to medical school. Likert Scale descriptors: Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree. **(A)** All students in medical school combined. N=259. **(B)** Student responses by year in medical school. M1: N=73; M2: N=69; M3: N=58; M4: N=58.

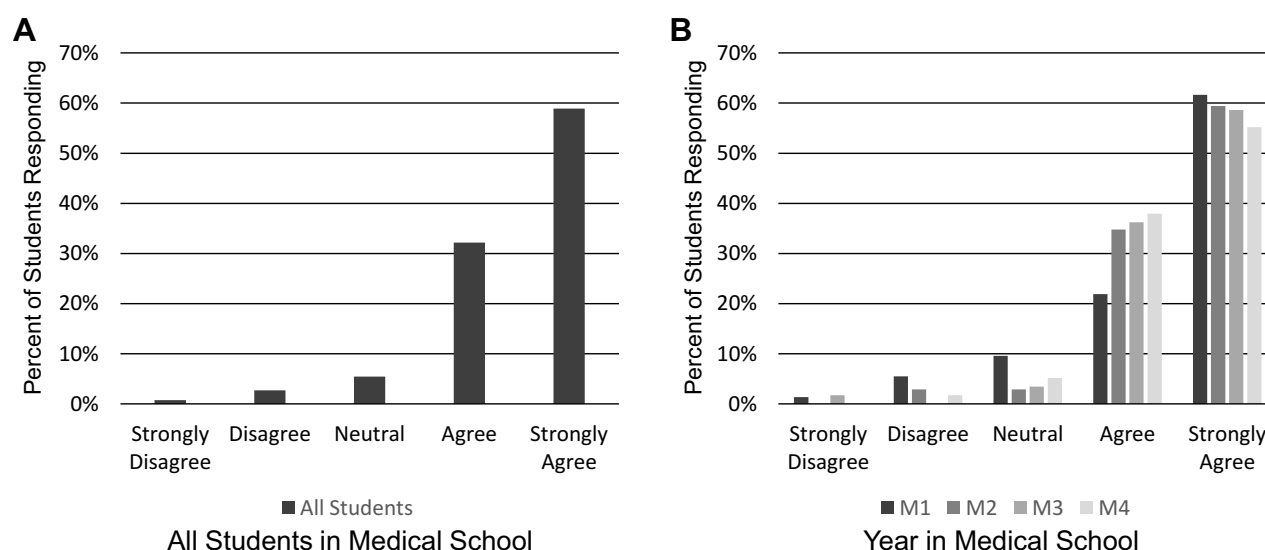


Figure 5 My clinical experiences through the EMT program increased my awareness of patients' lives and circumstances. Student responses to the EMT program increasing awareness of patients' lives and circumstances. Likert Scale descriptors: Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree. **(A)** All students in medical school combined. N=259. **(B)** Student responses by year in medical school. M1: N=74; M2: N=69; M3: N=58; M4: N=58.

Ninety-one percent of students agreed or strongly agreed that the EMT program increased awareness of patients' lives and circumstances (Figure 5A). Results separated by year in school were similar (Figures 5B).

Discussion

Our results show that EMT coursework early in the medical education curriculum plays an important role in helping students transition into medical school and increasing awareness in patients' lives and circumstances. Our results also show that for matriculating students, only forty-three percent stated the EMT program and experience factored into their decision to apply to our school with approximately half reporting that the course factored into their decision to actually attend.

It is not surprising that students felt the EMT coursework helped with the transition to medical school as our data supports a reflection by a physician that completed EMT training as part of their undergraduate medical education.²⁴ We previously reported that the EMT curriculum made students more confident in their clinical skills and allowed students to practice patient-based care while interacting with other members of the health care team.¹⁶ In addition to the coursework, students continue to have clinical experiences through their monthly EMS shifts in the first two years. The EMT program also introduces students to the small group work environment early in their medical school experience which affords the opportunity to establish relationships with their classmates, serves to promote class solidarity, and provides some time to become familiar with new expectations and routines of medical school prior to entering their more rigorous science coursework. The early experiences with other students may also play a role in helping students transition to medical school as it has been reported that “good contact with fellow students and teachers” were perceived as supportive. This perceived support was through the design of a revised curriculum for first year medical students.²⁵ Of interest, the EMT course ends with a mass casualty disaster exercise where students have the opportunity to apply their cognitive and psychomotor skills and introduces students to interprofessional health concepts by working with other first responder law enforcement, fire department, and EMS providers.²⁶

Other schools facilitate the student transition to medical school through pre-matriculation programs that target content specific areas, focus on more holistic approaches, target specific groups of entering students, or through a work integrated learning program.^{8–10,12,13,22,27} The work-integrated learning program also assisted with applying to medical school as well as gaining higher comfort levels when interacting with actual patients.¹⁰ While each of these programs assisted with the transition, they were optional. The UofSC School of Medicine EMT course is a requirement and does not mandate pre-matriculation courses or work prior to entrance.

Perhaps the most important benefit of early EMT training is learning about and observing the environments where patients emanate. In this study, our students felt the clinical experiences through the EMT program increased their awareness of patients’ lives and circumstances and this perception was present through clinical training. This is a continuation of work we have previously reported after the end of the first year where students perceived that they had a better understanding of their patient population.¹⁶

Limitations of this study include that we did not survey all applicants to the medical school to determine if the EMT program factored into their decision to apply to our school. We only surveyed students that matriculated into the program leading to potential for sampling and hindsight bias. A second limitation of the study is we performed a cross-sectional study with some students recently completing the EMT training and other students completing the course several years earlier. This may factor into social desirability bias with first- or second-year medical students wanting to view the program in a more favorable light. A third limitation of the study is the lower response rates from students in the third and fourth year of medical school. It is unclear why the response rates were lower; but, it is possible that student schedules, other responsibilities, and time required to complete the EMT survey contributed to the lower response rates.

Conclusion

In conclusion, first year medical students perceived that the EMT course helped them transition into medical school and others perceived that the course increased their awareness of patients’ lives and circumstances within the community. The EMT program influenced some students’ decision to apply to and attend the UofSC School of Medicine Greenville. The findings in this study provide an approach for schools to consider when developing medical education curricula that will help students transition to medical school. Future work should focus on determining how medical school curricula influence a student’s decision to apply to and attend a specific school. Second, future work should focus on comparison of the types of programs and curricula that schools use to assist students with the transition to medical school.

Ethics Approval and Consent to Participate

This study received exemption from Human Research Subjects on 2/4/2019 by the University of South Carolina institutional review board. The research was exempted in accordance with 45 CFR 46.104(d)(2). The research is compliant with the Declaration of Helsinki. Student survey data was gathered voluntarily and anonymously. The de-identified data was housed in a password protected electronic file. The reference number is Pro00086173.

Author Contributions

All authors contributed to the conception and design of the work, data analysis, drafting or revising the article, have agreed on the journal to which the article will be submitted, gave final approval of the version to be published, and agree to be accountable for all aspects of the work.

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Disclosure

The authors report no conflicts of interest in this work.

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