


Emergency Medical Technician Training in Medical School on Preparation for Required National Board Exams and Clerkship Rotations: Results from a Student Survey

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Purpose: The University of South Carolina School of Medicine Greenville has incorporated Emergency Medical Technician (EMT) training into the first semester curriculum with students becoming state-certified EMTs and completing one ambulance shift per month throughout their pre-clerkship years. Although there have been programs that have reported EMT experiences in the pre-clinical years of medical education, student perceptions of how the EMT experiences help prepare them for board exams and clerkships is limited. Therefore, the aim of this study was to measure student perceptions regarding the impact of an EMT course and training in the pre-clerkship curriculum in medical school on helping prepare them for national board exams (ie USMLE® Step 1, 2 Clinical Knowledge (CK), 2 Clinical Skills (CS)) and clerkship rotations.

Methods: Second-, third-, and fourth-year medical students at the University of South Carolina School of Medicine Greenville completed an anonymous voluntary survey with response rates of 66.3%, 55.2%, and 56.9%, respectively. The study was reviewed and exempted by the University of South Carolina Institutional Review Board.

Results: Seventeen percent, 14%, and 41% of students agreed/strongly agreed an EMT course helped prepare them for the USMLE Step 1, Step 2 CK, and Step 2 CS exam, respectively. Sixty-four percent of students agreed/strongly agreed that an EMT course and experience helped prepare them for clerkship rotations.

Conclusion: The findings in this study support EMT training and experience as an EMT as one method to help prepare students for clerkship rotations.

Keywords: emergency medical technician, medical school curriculum, USMLE Step 1, USMLE Step 2 CK, USMLE Step 2 CS, clinical preparation

Introduction

In 1910, Flexner published a report that would transform medical education for the next century by recommending two years of basic science training and two years of clinical training.¹ A century later, a new model for medical education emerged recommending an immersion of medical students into clinical experiences early in their medical education training.^{2,3} Many approaches have been taken to address this recommendation of immersion of medical students into clinical experiences.^{4–10}

It is important for medical school curricula to offer these early clinical experiences while preparing students for the United States Medical Licensing Examination® (USMLE) Step 1, USMLE Step 2 Clinical Knowledge (CK) and clinical rotations because medical schools map curricula to USMLE content.^{11,12}

Several medical schools have implemented emergency medical technician (EMT) training as part of their medical school curricula.^{13–18} Studies have indicated that such programs are perceived to boost confidence, provide a better

understanding of a student's patient population, and demonstrate a lasting impact on clinical education.^{14–18} An EMT's scope of practice is determined by each state but is usually at the basic life support level of care and is the minimum provider certification for an ambulance. Skills include patient assessment, triage, cardiopulmonary resuscitation, ventilation using a bag-valve-mask and airway adjuncts, assisting with childbirth, wound dressings and splinting, spinal motion restriction, automatic defibrillation, assisting patients with their prescribed medications, epinephrine administration by autoinjector for anaphylaxis, and ambulance operations. The University of South Carolina (UofSC) School of Medicine Greenville included an EMT training program into the first semester^{14,19,20} to provide this early clinical exposure. This program culminates in medical students becoming state certified EMTs. Following course completion, students are required to complete monthly clinical emergency medical service shifts throughout their pre-clinical years.^{14,19} The Zucker School of Medicine at Hofstra has mapped their EMT program required knowledge and required skills to physician-specific knowledge and skills, providing a direct link with the EMT training and their training as a physician.²¹

While the EMT programs have been implemented in medical school curricula, there is a paucity of information on the effect of EMT training and student perceptions in preparation for USMLE Step 1, Step 2 CK, and Step 2 Clinical Skills (CS) that are required for a student to become a licensed physician and for clerkship rotations. Student perceptions about the role of EMT training in helping prepare them for USMLE examination have been presented; however, the student perceptions were taken prior to students completing any of the USMLE exams or clinical coursework.¹⁴ Therefore, the aim of this study was to measure, after students completed exams and clinical experience, student perceptions regarding the impact of EMT training in the first semester of medical school and EMT experiences on helping prepare them for the USMLE Step 1, Step 2 CK, Step 2 CS, and clerkship rotations.

Methods

Survey Methods

A cross-sectional descriptive survey study design was used to measure student perceptions of whether an EMT course during medical school helped prepare them for required Step exams and clinical rotations. Second-, third-, and fourth-year students responding to this survey were the same students responding to a survey previously reported.²² However, the statements investigated in this study were different from those previously reported. Enrolled second-, third-, and fourth-year medical students at the UofSC School of Medicine Greenville were sent a survey link with the four statements listed in Table 1. Response options for the survey statements were strongly disagree = 1, disagree = 2, neutral = 3, agree = 4, and strongly agree = 5. The survey, hosted by SurveyMonkey®, was voluntary and anonymous. Reminder emails were sent eight and twenty days following the initial email with the survey closing twenty-eight days following the initial email. Second-year students responded only to the statement related to the preparation for USMLE Step 1 since the distribution date of the survey was after most students had completed Step 1, which follows completion of the second year before mid-May. There was a response option for those who had not yet completed this exam. Third-year students responded to the statements related to the preparation for Step 1 and clerkship rotations and fourth-year students responded to all four statements since they took Step 2 CK and Step 2 CS after completion of the third year in mid-May.

Statistical Analysis

The reliability of the survey was determined using Cronbach's alpha. The validity of the survey statements was determined using a Pearson correlation coefficient. For each statement, a Kolmogorov–Smirnov and Shapiro–Wilk test (test for normality) was completed to determine if the survey data was distributed normally. The survey data was not normally distributed; therefore, a one-way ANOVA (Kruskal–Wallis test) was performed with a Bonferroni post hoc test to determine differences between groups (ie second-year, third-year, and fourth-year) for statement 1 and a Mann–Whitney test was performed to determine differences between groups (ie third-year and fourth-year) for statement 2.

Table 1 Statements on Survey and Response Rate

	Second Year Students		Third Year Students		Fourth Year Students		Total Surveys for Each Statement	
Number of Survey Sent Per Class	104		105		102			
	NR	PR	NR	PR	NR	PR	NR	PR
My EMT coursework and clinical experiences through the EMT program taught at the UofSCSOMG helped prepare me for the USMLE Step 1.	69	66%	58	55%	58	57%	185	59%
My EMT coursework and clinical experiences through the EMT program taught at the UofSCSOMG helped prepare me for my clerkship rotations.	N/A	N/A	58	55%	58	57%	116	56%
My EMT coursework and clinical experiences through the EMT program taught at the UofSCSOMG helped prepare me for the USMLE Step 2 CK.	N/A	N/A	N/A	N/A	58	57%	58	57%
My EMT coursework and clinical experiences through the EMT program taught at the UofSCSOMG helped prepare me for the USMLE Step 2 CS.	N/A	N/A	N/A	N/A	58	57%	58	57%

Notes: N/A = students were not asked to respond to survey statement as they had not completed appropriate phase of training.

Abbreviations: EMT, emergency medical technician; UofSCSOMG, University of South Carolina School of Medicine Greenville; USMLE, United States Medical Licensing Examination; CK, clinical knowledge; CS, clinical skills; NR, number of students responding to survey; PR, percent of students responding to survey.

Ethical Approval

The study was given exempt status upon review 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

The overall student response rates are presented in Table 1. Median, interquartile range, and results for between-group comparisons for statements 1 and 2 are presented in Table 2. Overall responses and responses by year in school are presented in Figures 1–4.

The reliability of the survey was adequate, as the Cronbach's alpha for all statements was 0.897 (N = 58) and 0.774 (N = 116) for statements 1 and 2. Pearson correlation results are as follows: statement 1 and all other statements $r(56) =$

Table 2 Median Response Values for Survey Statements

	Year in School		
	Second Year (M2)	Third Year (M3)	Fourth Year (M4)
Number of students	69	58	58
My EMT coursework and clinical experiences through the EMT program taught at the UofSCSOMG helped prepare me for the USMLE Step 1.	3 (2) ***	2 (1)	2 (2)
My EMT coursework and clinical experiences through the EMT program taught at the UofSCSOMG helped prepare me for my clerkship rotations.	N/A	4 (1)	4 (1)
My EMT coursework and clinical experiences through the EMT program taught at the UofSCSOMG helped prepare me for the USMLE Step 2 CK.	N/A	N/A	2 (2)
My EMT coursework and clinical experiences through the EMT program taught at the UofSCSOMG helped prepare me for the USMLE Step 2 CS.	N/A	N/A	3 (2)

Notes: Results are reported as median score (interquartile range) of Likert scale responses. Likert scale response options for each question were: strongly disagree = 1, disagree = 2, neutral = 3, agree = 4, and strongly agree = 5. *** $p < .001$ compared to M3 and M4 students.

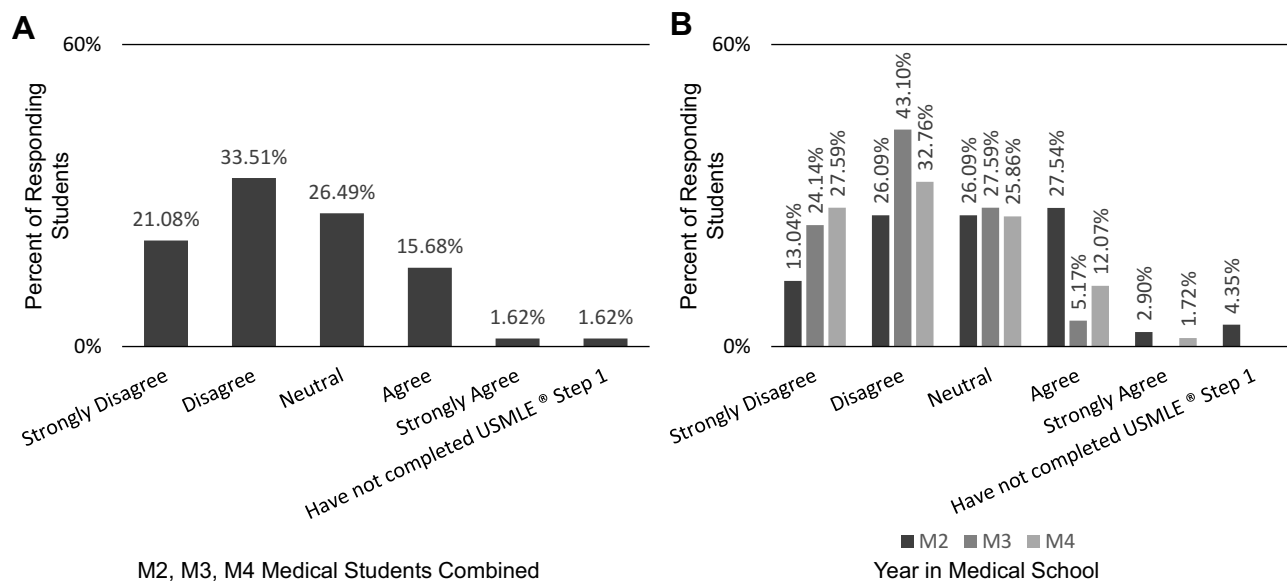


Figure 1 EMT coursework and clinical experiences through the EMT program helped prepare me for Step 1. Student responses to the statement: My EMT coursework and clinical experiences through the EMT program helped prepare me for the USMLE Step 1. Likert Scale descriptors: Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree. (A) All students in second, third, and fourth year combined. N=185 (60). (B) Student responses by year in medical school. M2: N=69 (66); M3: N=58 (55); M4: N=58 (57).

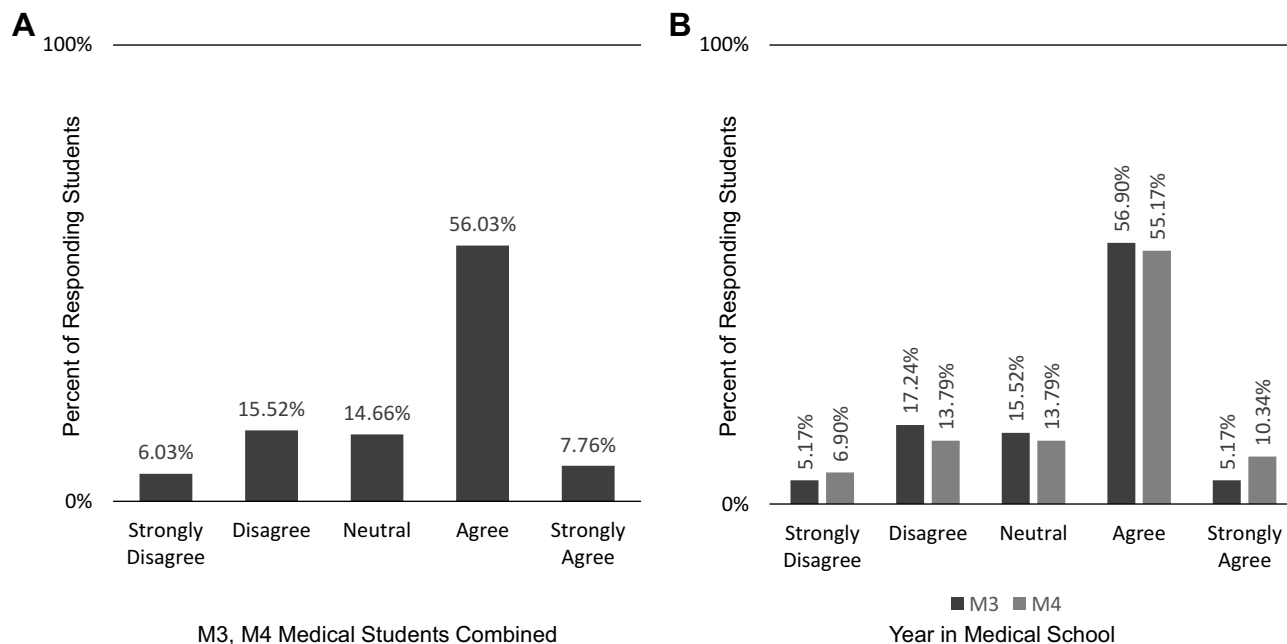


Figure 2 EMT coursework and clinical experiences through the EMT program helped prepare me for clerkship rotations. Student responses to the statement: My EMT coursework and clinical experiences through the EMT program helped prepare me for my clerkship rotations. Likert Scale descriptors: Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree. (A) All students in third and fourth year combined. N=116 (56). (B) Student responses by year in medical school. M3: N=58 (55); M4: N=58 (57).

0.910, $p < 0.001$; statement 2 and all other statements $r(56) = 0.806$, $p < 0.001$; statement 3 and all other statements $r(56) = 0.907$, $p < 0.001$; statement 4 and all other statements $r(56) = 0.884$, $p < 0.001$.

Seventeen percent of respondents agreed or strongly agreed that the EMT program helped prepare them for Step 1 (Figure 1A). When separated by year in school, students that had just completed the second year and Step 1 had the highest percent of agree and strongly agree, 30%, compared to students that had just completed the third and fourth year,

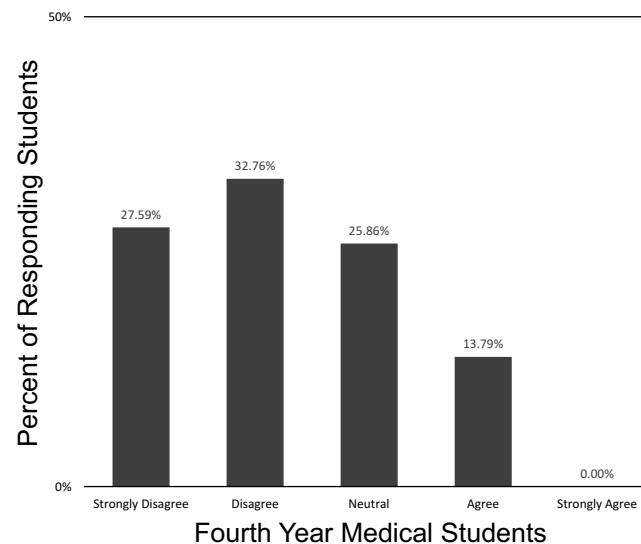


Figure 3 EMT coursework and clinical experiences through the EMT program helped prepare me for Step 2 CK. Fourth-year medical student responses to the statement: My EMT coursework and clinical experiences through the EMT program helped prepare me for the USMLE Step 2 CK. Likert Scale descriptors: Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree. N=58 (57).

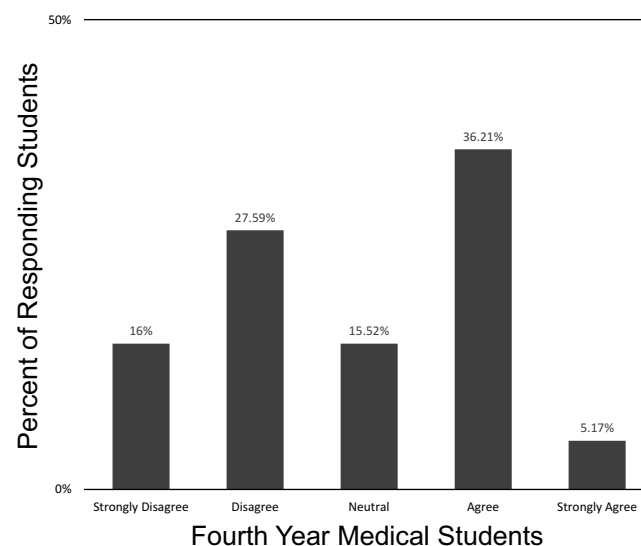


Figure 4 EMT coursework and clinical experiences through the EMT program helped prepare me for Step 2 CS. Fourth-year medical student responses to the statement: My EMT coursework and clinical experiences through the EMT program helped prepare me for the USMLE Step 2 CS. Likert Scale descriptors: Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree. N=58 (57).

5% and 15%, respectively (Figure 1B). In addition, the response scores were significantly higher for students that had just completed the second year compared to students that had just completed the third and fourth years (Table 2).

Sixty-four percent of students agreed or strongly agreed that the EMT program helped prepare them for clerkship rotations (Figure 2A). The percent of agreed or strongly agreed remained similar for responses by year in school (Figure 2B and Table 2).

Fourteen percent of respondents agreed that the EMT program helped prepare them for Step 2 CK (Figure 3).

Forty-one percent of respondents agreed or strongly agreed that the EMT program helped prepare them for Step 2 CS (Figure 4).

Discussion

In this study, most students perceived that an EMT course taken in the first year of medical school helped in their preparation for required clerkship rotations in the third year. Most students, however, did not perceive the EMT course as being helpful in preparing for Step 1, Step 2 CK, or Step 2 CS.

Student perceptions of preparedness regarding USMLE exams are not surprising. While early EMT training does expose students to clinical knowledge, there is a clear difference in the scope of training by the governing academic bodies of EMTs and Physicians. The curriculum for the EMT course is designed for students to pass the National Registry of Emergency Medical Technicians exam and to become licensed EMTs by the state of South Carolina. Becoming state-certified reinforces the student's ability to continue with EMS field experiences during the remainder of their first year and throughout their second year of school, which ultimately affords each student a better understanding of population health.¹⁴

Medical schools must balance training students to be physicians and providing curricula that prepare them for Step 1 and Step 2 CK since these are important factors cited by program directors when selecting applicants for a residency program.²³ While most students do not feel the EMT experience directly prepared them for the Step 1, Step 2 CK, and Step 2 CS exams, EMT training and associated experiences did provide valuable skills and experiences necessary for developing one's self as a physician beyond preparation for licensing exams.^{14,15}

The USMLE Step 2 CS was recently discontinued²⁴ as an external skills assessment; however, students are still assessed on clinical skills throughout clinical rotations using the objective structured clinical exam (OSCE). This study did not directly address student perceptions on how the EMT program prepared them for OSCEs or other internal clinical exams.

While the reasons why the EMT course helped prepare students for clerkship rotations were not studied, we speculate that it is multifaceted and could be attributed to increased confidence in clinical and patient care skills,^{14,15} team building,¹⁵ early clinical exposure to patient care, and institution and patient familiarity provided in the EMT curriculum.

Medical students received at least 21 hours of patient assessment training and 20 hours of clinical skills training throughout the EMT course, often working with standardized patients. Instruction was often provided in small groups with guidance from trained medical professionals active in the field. Students learned technical skills such as history and physical examination, medical illness and traumatic injury management, and life-saving medical interventions. Many of the skills taught are not only required for an EMT practice but are used during third-year rotations as well. A prior study demonstrated improved confidence and perceived aptitude in patient care skills by medical students after an EMT course, which could likely reflect our findings.¹⁵

After training and certification, the EMT program provided approximately 150 clinical field hours per student throughout their preclinical years. These hours allowed students to use clinical knowledge to manage the care of real patients as part of an interprofessional team, which is an experience that cannot be equated to book learning or standardized patients.^{14,19} While this training provides a framework for medical students to think as diagnosticians and clinicians, it also provides the medical student with an understanding of the roles different providers play in the healthcare system.¹⁴ This, in turn, may serve to strengthen a student's desire to more actively participate in clerkship rotations during the third year. Our findings on perceived preparation for clerkship rotations reflect findings from prior studies that indicated positive impacts of early clinical exposure on performance,^{25,26} patient care skills and team-building skills.¹⁵

This study was designed to specifically address student perceptions of the EMT program for preparing them for future licensing exams and clerkship rotations. Future research building on this data will focus on how the EMT program influences students' career decisions and how the EMT program experiences may be used for educational purposes in the biomedical sciences and health systems improvements.

One limitation of this study is the low response rate. A second limitation of the study is that students were not asked why they felt the EMT program prepared them for clerkship rotations. A third limitation of the study is that data were collected from one US medical school. This may limit the generalizability of the data to other medical schools.

Additional research is needed by other medical schools that offer EMT training during medical school, on the impact of the training on clerkship rotations and clinical preparation.

Conclusion

The findings in this study support EMT training and experience as one method to help prepare students for clerkship rotations. While the course was developed as a unique way to provide students with the opportunity to better understand their patient population and provide early clinical exposure, students also feel they are being prepared for clinical learning that occurs later in their medical education curriculum. Our study also found that students felt the EMT training and experience did not prepare them for USMLE Step 1, Step 2 CK, or Step 2 CS.

Ethics Approval and Consent to Participate

This study received an exemption from Human Research Subjects on 2/4/2019 by the University of South Carolina's 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 made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; 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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