



RESEARCH REPORTS

# UNDERSTANDING THE EMERGENCY MEDICAL TECHNICIAN TRAINING PIPELINE: AN INITIAL EVALUATION OF A STATEWIDE HYBRID EMT TRAINING PROGRAM

Nathaniel W. Steinlicht, MPA\*<sup>1</sup>; Taylor L. Rose, BS<sup>1</sup>; Travis H. Spier, MSN<sup>2</sup>; Paul J. Schueth, EMT I99<sup>3</sup>

*Author Affiliations:* 1. University of South Dakota, Vermillion, SD, USA; 2. Sanford Health, Sioux Falls, SD, USA; 3. Tripp County Ambulance Service, Winner, SD, USA.

*Recommended Citation:* Steinlicht, N., Rose, T., Spier, T., & Schueth, P. (2025). Understanding the emergency medical technician training pipeline: An initial evaluation of a statewide hybrid emt training program. *International Journal of Paramedicine*. (12). 115-122. <https://doi.org/10.56068/LNZM7876>. Retrieved from <https://internationaljournalofparamedicine.com/index.php/ijop/article/view/3376>

*Keywords:* certification examination, emergency medical technicians, training, emergency medical services, EMS, paramedicine

*Disclosures:* None

*Funding:* This work was supported by the Substance Abuse and Mental Health Services Administration under Grant H79TI087099. Tripp County provided contract funds for evaluation of training program.

*Received:* April 4, 2025

*Revised:* May 20, 2025

*Revised:* August 6, 2025

*Accepted:* August 23, 2025

*Published:* October 8, 2025

\*Corresponding Author: [nathaniel.steinlicht@usd.edu](mailto:nathaniel.steinlicht@usd.edu)

## ABSTRACT

High-quality emergency medical services (EMS) training with high licensure exam passage rates are crucial for a robust prehospital emergency care system. This study examines the EMS training pipeline, focusing on hidden steps and trainee characteristics that facilitate successful progression. Current research emphasizes course completion and licensure exam passage but often overlooks the final step of trainees working or volunteering as EMS professionals, particularly in rural areas. Data was collected via a survey distributed to 386 participants of three hybrid EMT courses in 2022-2023, with a 25.1% response rate. The survey gathered demographic data, licensure status, willingness to pay for training, and confidence in performing EMT duties. Demographic information included age, sex, race, education, and ZIP code, which was cross-referenced to determine rural residency. Participants were asked about their current stage in the EMT licensure process and their maximum willingness to pay for the course. Confidence was measured using a 5-point Likert scale. Analysis involved three logistic regression models to identify factors influencing taking the NREMT exam, passing the exam, and working or volunteering as an EMT. Several trainee characteristics show statistically or practically significant effects on a students' post-training progression through the pipeline including the previously unexplored step of taking the required licensing exam. The analysis also identified that rural trainees face greater challenges taking and passing the licensing exam than non-rural trainees but are more likely to work or volunteer as an EMT than their non-rural counterparts. This evaluation also examines the role of monetary value and training outcomes and identified some positive association between the amount students were willing to pay and their progression through the EMS workforce pipeline. The study's findings inform program design and highlight the need for recruitment from younger populations to grow the EMS workforce, particularly in rural areas.

## INTRODUCTION

High quality emergency medical service (EMS) training with minimal course attrition and high licensure exam passage rates are the foundation of a strong prehospital emergency care system. This educational pipeline ensures that EMS clinicians are prepared to meet the challenges and expectations of the profession and that there is an adequate supply of clinicians to

meet patients' prehospital care needs. Current understanding of this pipeline focuses on course completion and subsequent passage of the requisite licensure exam. Trainees start the course, complete the requisite modules with satisfactory proficiency, graduate from the course, and then pass the required licensure exams. What is not included in the research is the end goal of the trainee working, or more likely volunteering in the case of many rural emergency medical technicians (EMTs), as an EMS professional. In the operation of a statewide EMT training program, there are several hidden steps in the training pipeline currently not discussed in the research. The purpose of this paper is to highlight these additional points along the pipeline and identify trainee characteristics that facilitate successful movement through the pipeline.

Current research has focused on course completion, exam passage, and program and trainee characteristics associated with higher completion and passing rates. Moungey et al. (2021) examined data from the national licensure exams for EMTs and paramedics to identify program characteristics associated with higher pass rates, finding a positive association between higher pass rates and program size, as well as geographic region. Other examinations of program characteristics with positive effects on pass rates include longer program length, accreditation, smaller class sizes, and instructor and instructional material quality (Ball et al., 2023; Dickison et al., 2006; Russ-Eft et al., 2010). Examinations of trainee characteristics focus on trainee demographics, such as sex, previous education, and completing a pre-course training (Chapman et al., 2016; Fernandez et al., 2008; Powell et al., 2021; Renkiewicz & Hubble, 2015). Both Powell et al. (2021) and Renkiewicz and Hubble (2015) consider trainees outside the traditional pipeline with the former looking at trainee characteristics as they relate to retesting after failing an exam and the latter examining the impact of pre-course training on EMS on course completion.

The aim of this analysis is to apply and extend these known trainee characteristics to a single EMT training to identify areas of improvement for this program. This analysis will look at three events in the post-training pipeline, taking the NREMT, passing the NREMT, and working or volunteering as an EMT to analyze how the trainees move through this pipeline. The research questions for this analysis include:

- How do trainee characteristics influence a trainee taking the NREMT?
- What effect, if any, does living in a rural area have on a trainee's progression through the EMS pipeline?
- What effect, if any, does a trainee's reported willingness to pay for EMT training have on their progression through the EMS pipeline.

The first question has not been studied before in the published peer-review literature, but remains a crucial drop-off point for the EMT training program under analysis. The other two questions test additional trainee characteristics also not present in the literature, but that are also crucial factors for the training program given its focus on training rural residents as EMTs and potential for alternative tuition funding methods at the federal, state, and local levels. The results of this analysis will inform program design for the EMT training program and serve as a foundation for further research into the EMT training pipeline.

## METHODS

### DATA COLLECTION

Data was collected through a survey distributed via email to the 386 individuals who participated in three hybrid EMT courses held in 2022 and early 2023. Prior to administering the survey, the University of South Dakota Institutional Review Board reviewed the project and determined it was exempt from human subject's regulations due to it being an evaluation. All trainees who were enrolled in the EMT training program were invited to participate in the survey. The survey was open for responses for a total of four weeks, from mid-July 2023 to mid-August 2023. Eight participants (2.1%) were not reached due to invalid email addresses. Out of the 378 participants who received the emails asking them to complete the survey, 95 (25.1%) completed the survey.

The survey questions collected demographic data on participant's licensure status, willingness to pay for the EMT training, and confidence in performing EMT duties. Demographic information included age, sex, race, education, and ZIP code. ZIP codes were cross-referenced with the Health Resources and Services Administration's rural ZIP Code file to determine rural residency (Federal Office of Rural Health Policy, 2025). Participants were asked about their current stage in the EMT licensure process. They were also asked about the maximum amount they were willing to pay for the course, starting at \$50 and increasing incrementally by \$100 to \$1,000. If they were unwilling to pay \$50, their response was recorded as 0. Confidence was recorded using a 5-point Likert scale with 1 being "Not at all confident" and 5 being "Very confident" on a variety of EMT skills including patient assessment, cardiopulmonary resuscitation and first aid, and documentation and reporting.

### PARTICIPANT CHARACTERISTICS

Participants were asked to report their demographics to assist in identifying potential characteristics that may impact students' taking the National Registry of Emergency Medical Technicians (NREMT) exam, passing the NREMT exam, and working or volunteering as an EMT. The full demographic results can be found in Table 1 below. The typical respondent lives in a rural area, 67 (70.5%), is female, 65 (68.4%), and is white, 90 (94.7%). There was variation in terms of the age categories respondents selected, with 33 (34.7%) respondents reporting an age of 18-24 and the next two highest being 35-44, 26 (27.4%) and 25-34, 22 (23.2%). The largest group for education level was high school diploma or equivalent with 23 (24.2%) responses. The next categories with the highest response rates were 22 (23.2%) reporting some college credit but no degree, followed by 18 (18.9) possessing a bachelor's degree. Dummy variables were created for sex, race, and education to simplify analysis due to small subpopulation numbers.

In addition to these characteristics, there was also significant variation in the two additional trainee characteristics added to the analysis: participants' maximum amount they are willing to pay and their overall confidence in their ability to respond to a variety of EMS emergencies. The maximum amount participants reported being willing to pay ranged widely from 6 (6.3%) of respondents reporting they would not pay even \$50 for the course to 10 (10.5%) of respondents reporting they would pay \$1,000 or more for the training. The amount with the highest number of respondents was \$100 with 24 (25.3%). Trainees' answers to the confidence questions were summed individually into a final

confidence score with the maximum possible value being 120 and the minimum possible value being 24. The mean score for this confidence index was 98.6 with a median of 102 and a standard deviation of 17.0.

**ANALYSIS**

Analysis of this data involved three separate logistic regression models for taking the NREMT exam, passing the NREMT exam, and working or volunteering as an EMT. The outcome variables examined in these models were binary variables measuring if a participant took the NREMT exam, passed the NREMT exam, and is working or volunteering as an EMT. Predictors of these outcome variables include the maximum amount the participant would be willing to pay, their total confidence in their EMT skills, age category, and binary variables indicating if the participant is a rural resident, male, white, and has at least some college education. Initial testing for possible confounding variables yielded no statistically significant results for the included variables, indicating no need for the addition of interaction terms.

**RESULTS**

The results of the logistic regression models reveal statistically significant factors for success, although no one factor was statistically significant ( $p < 0.05$ ) across all three models. The sample size included 95 respondents who had successfully completed the EMT training under evaluation. The respondents tended to come from rural areas (67, 70.5%), be female (65, 68.4%), and have some college education (71, 74.8%).

For factors influencing taking the NREMT exam (Table 2), the variable showing statistical significance was respondents' total confidence in their abilities, which was positively associated with a 3.73% increase in the odds of taking the NREMT exam for each unit increase in confidence. Also, the maximum amount participants were willing to pay was positively associated with a 0.13% increase in taking the NREMT per additional dollar willing to pay, which was not statistically significant at  $p < 0.05$  but remains practically significant. Being white also had a practically large effect size with a 219.78% increase in

| Demographics  | n  | %      |
|---|----|--------|
| <b>Rural Resident</b>   |    |        |
| Yes   | 67 | 70.5%  |
| No  | 28 | 29.5%  |
| <b>Age</b>  |    |        |
| 17 or Younger   | 1  | 1.1%   |
| 18-24   | 33 | 34.7%  |
| 25-34   | 22 | 23.2%  |
| 35-44   | 26 | 27.4%  |
| 45-54   | 7  | 7.4%   |
| 55-64   | 5  | 5.3%   |
| 65 and Older  | 1  | 1.1%   |
| <b>Sex</b>  |    |        |
| Male  | 30 | 31.6%  |
| Female  | 65 | 68.4%  |
| <b>Race</b>   |    |        |
| Alaska Native   | 0  | 0.0%   |
| American Indian   | 2  | 2.1%   |
| Black or African American                                       | 0  | 0.0%   |
| Asian   | 1  | 1.1%   |
| Native Hawaiian or Other Pacific Islander                       | 0  | 0.0%   |
| White   | 90 | 94.7%  |
| Prefer Not to Say   | 2  | 2.1%   |
| <b>Education</b>  |    |        |
| Some High School, No Diploma                                    | 1  | 1.1%   |
| High School Diploma or the Equivalent                           | 23 | 24.2%  |
| Some College Credit, No Degree                                  | 22 | 23.2%  |
| Trade/Technical/Vocational Training                             | 9  | 9.5%   |
| Associate Degree  | 14 | 14.7%  |
| Bachelor's Degree   | 18 | 18.9%  |
| Master's Degree   | 5  | 5.3%   |
| Other   | 3  | 3.2%   |
| <b>Trainee Status in EMS Educational Pipeline</b>               |    |        |
| Completed the Course  | 95 | 100.0% |
| Taken the NREMT   | 54 | 56.8%  |
| Passed the NREMT  | 45 | 47.4%  |
| Working/Volunteering as an EMT                                  | 33 | 34.7%  |
| Note: Percentages may not total exactly to 100% due to rounding |    |        |

Table 1: Participant Characteristics.

the odds of taking the exam. This is likely due to respondents being predominantly white, with only 5.3% of respondents being nonwhite. Male, rural, and partially college educated participants had decreased odds of 30.55%, 42.93%, and 30.26% respectively of taking the exam.

For factors influencing passing the NREMT exam, two variables showed statistical significance at the  $p < 0.05$  level. Increases in the maximum amount students were willing to pay led to a 0.19% increase in the odds of passing the exam for each additional dollar. Additionally, a one unit increase in the participant's total confidence in their EMT skills led to a 4.3% increase in the odds of passing the exam. Having at least some college education also had a positive, practically significant, increase in a participant reporting passing the NREMT exam, with a large effect size, leading to a 59.55% increase in the odds of passing the NREMT exam. Participants in older age categories and living in rural areas had practically significant decreases in their odds of passing the exam at 26.29% and 35.28% respectively.

When looking at factors influencing a participant working or volunteering as an EMT, a few important factors influence this stage of the EMS pipeline. The first was age, as an increase in age category was negatively associated with working or volunteering as an EMT and decreased the odds of passing by 26.29%. Practically significant variables included being a rural resident and having at least some college education, leading to increases of 220.02% and 164.92% respectively of working or volunteering as an EMT. No other variables had statistically or practically significant variables for this model.

**DISCUSSION**

In the aftermath of the COVID-19 pandemic, the shifting size and composition of the EMS workforce is crucial to a robust pre-hospital care system by ensuring that there is an adequate supply of EMS clinicians (Gage et al., 2024; Woodward et al., 2025). The first step to maintaining and growing that workforce is to find ways to support potential new EMTs and assist them in navigating their initial training. This analysis identifies several variables with statistical or practical significance at multiple points in a trainee's journey to working as an EMT. These variables identify important barriers and facilitators in this journey to improve the structure and design of the hybrid EMT training program under evaluation.

The training program evaluated primarily focuses on training new EMTs who are younger and living in rural areas. Challenges for rural EMT training have long been

|                                     | Taking NREMT Exam          | Passing the NREMT         | Working / Volunteering as EMT |
|-------------------------------------|----------------------------|---------------------------|-------------------------------|
| Intercept                           | 0.0275<br>(0.0006-0.9154)  | 0.0165<br>(0.0003-0.6222) | 0.0395<br>(0.0004-2.1387)     |
| Maximum Amount Willing to Pay       | 1.0013<br>(0.9997-1.003)   | 1.0019<br>(1.0003-1.0036) | 1.0014<br>(0.9997-1.0031)     |
| Total Confidence                    | 1.0373<br>(1.0091-1.0691)  | 1.043<br>(1.0129-1.0783)  | 1.0262<br>(0.9953-1.0615)     |
| Age                                 | 0.8531<br>(0.5417-1.3168)  | 0.7371<br>(0.4521-1.1583) | 0.5145<br>(0.2852-0.8603)     |
| Rural Resident                      | 0.5707<br>(0.1919-1.6231)  | 0.6472<br>(0.2161-1.888)  | 3.2002<br>(0.9965-11.6503)    |
| Is Male                             | 0.6945<br>(0.2608-1.8354)  | 0.9765<br>(0.3597-2.6484) | 0.999<br>(0.3596-2.7131)      |
| Is White                            | 3.1978<br>(0.4705-29.5022) | 1.0546<br>(0.1469-9.7172) | 1.0252<br>(0.1079-23.6077)    |
| Has at Least Some College Education | 0.6974<br>(0.189-2.4463)   | 1.5955<br>(0.4582-5.7041) | 2.6492<br>(0.7175-10.8607)    |

Table 2: Logistic Regression Results – Odds Ratios (95% Confidence Intervals).

known but previous research has focused on examining regional pass rates for programs instead of focusing on individual characteristics (Freeman et al, 2009, Moungey et al., 2021). While this analysis lacks the larger sample size of these analyses, the significant negative effects on taking and passing the NREMT and significant positive effects on working or volunteering as an EMT for trainees from rural areas should not be ignored. Rather this information highlights the need for new learning strategies and supports increasing the odds of rural trainees taking and passing the NREMT exam, especially since these rural residents are much more likely to end up working or volunteering as an EMT than their non-rural counterparts.

The results of this evaluation also provide further context for literature exploring trainee demographics associated with passage of the NREMT by looking at the previously unexamined step of taking the NREMT. Several prior studies report positive associations for being a male trainee and passing the NREMT, but male trainees in the evaluated program were less likely to even attempt taking the NREMT (Dickison et al., 2006; Fernandez et al., 2008; Powell et al., 2021). This is partially due to the trainee demographics for the training program being representative of the areas the training is provided in and not a national sample as others have examined, but it does underscore the need to reevaluate how NREMT result rates are interpreted. While this will complicate the discussion around pass rates, the group of non-NREMT taking trainees needs to be included in the discussion as they are a ready population with almost all qualifications needed to serve as an EMT.

Evaluation of training costs in relation to training outcomes is another important area of research largely untouched by the current EMS and broader health professions literature (Foo et al, 2019). This evaluation was concerned with the monetary value the trainees gave to the training to identify any possible associations between this value and the outcome variables in question. This monetary value was positively associated with an individual passing the NREMT and led to an important shift in design for the program evaluated. Before this evaluation, EMT tuition and textbook were provided at no-cost due to state, federal, and private funding for many trainees. Based on this analysis, the program was redesigned so that all trainees were required to pay for the textbook, which would cover part of the total training cost while the rest remained covered by other funding. Evaluation of this change is ongoing to determine the effect of limiting the amount of financial support for each individual trainee given that the program wants to build a more robust EMS workforce in the state it serves while also being a responsible steward of the funding provided.

## LIMITATIONS

This evaluation is limited by its intended scope as well as a low response rate. The intent of this analysis was to inform program design for the EMT training program under evaluation and cannot be generalized to all EMT trainings. First, the demographics of the trainees who responded to the survey do not align with national statistics especially given that the program has mostly white students from rural areas. This skewed population does create potential response bias which may have a particularly strong effect on the results of the model analyzing probability of taking the NREMT. This analysis also only focuses on one training program in particular, which further limits generalizability of the study findings.

The survey also had a low response rate, which additionally limits the generalizability of the findings. Only 95 (25.1%) respondents were included in the final analysis because they completed the training. This response rate is low which introduces the possibility of non-response bias leading to non-response error, but this error is likely low due to the large enough absolute sample size. There were 5 respondents who did not complete the training but did respond to the survey that were excluded because they would not be eligible to progress further in the steps under analysis in this study. Additionally, the survey was administered in July and August 2023 to trainees who participated in three EMT courses held in 2022 and first half of 2023, which creates another opportunity for bias with participants from the more recent classes having less time to progress down the pipeline.

## CONCLUSION

The EMS workforce plays a critical role in pre-hospital care and a strong pipeline to sustain and grow that workforce is necessary for a robust prehospital system. There are statistically and practically significant factors influencing an EMT trainee's pathway to licensure which provide valuable insight into the design and provision of EMT training. The results of this analysis find the rural trainees face greater challenges taking and passing the NREMT than non-rural trainees but are more likely to work or volunteer as an EMT than their non-rural counterparts. Additionally, findings indicate the need for further research into the entire pathway to working or volunteering as an EMT, such as taking the NREMT, which may lead to more innovations in program design and improvement. This evaluation also examines the role of monetary value and training outcomes and identified some positive association between the amount students were willing to pay and their progression through the EMS workforce pipeline. Further research should be done into this area as well since there is little known in this area related to EMS or even broader health profession training.

## REFERENCES

- Ball, M., Powell, J. R., Gage, C. B., Kapalo, K. A., Kurth, J. D., Collard, L., Miller, M. G., & Panchal, A. R. (2023). Paramedic educational program attrition accounts for significant loss of potential EMS workforce. *JACEP Open*, 4(2), e12917. <https://doi.org/10.1002/emp2.12917>
- Chapman, S. A., Crowe, R. P., & Bentley, M. A. (2016). Recruitment and retention of new emergency medical technician (EMT)-basics and paramedics. *Prehospital and Disaster Medicine*, 31(S1), S70-S86. <https://doi.org/10.1017/s1049023x16001084>
- Dickison, P., Hostler, D., Platt, T. E., & Wang, H. E. (2006). Program Accreditation Effect on Paramedic Credentialing Examination Success Rate. *Prehospital Emergency Care*, 10(2), 224–228. <https://doi.org/10.1080/10903120500541126>
- Federal Office of Rural Health Policy. (2025). *Federal Office of Rural Health Policy (FORPH) Data Files*. Health Resources and Services Administration. Accessed from: <https://www.hrsa.gov/rural-health/about-us/what-is-rural/data-files>
- Fernandez, A. R., Studnek, J. R., & Margolis, G. S. (2008). Estimating the Probability of Passing the National Paramedic Certification Examination. *Academic Emergency Medicine*, 15(3), 258–264. Portico. <https://doi.org/10.1111/j.1553-2712.2008.00062.x>

- Foo, J., Cook, D. A., Walsh, K., Golub, R., Abdalla, M. E., Ilic, D., & Maloney, S. (2019). Cost evaluations in health professions education: a systematic review of methods and reporting quality. *Medical Education*, 53(12), 1196–1208. Portico. <https://doi.org/10.1111/medu.13936>
- Freeman, V. A., Slifkin, R. T., & Patterson, P. D. (2009). Recruitment and Retention in Rural and Urban EMS. *Journal of Public Health Management and Practice*, 15(3), 246–252. <https://doi.org/10.1097/phh.0b013e3181a117fc>
- Gage, C. B., Powell, J. R., Cash, R. E., & Panchal, A. R. (2023). Prehospital Workforce Changes: 10-Year Evaluation of National Registry Certifications. *Prehospital Emergency Care*, 28(2), 333–334. <https://doi.org/10.1080/10903127.2023.2249566>
- Moungy, B. M., Mercer, C. B., Powell, J. R., Cash, R. E., Rivard, M. K., & Panchal, A. R. (2021). Paramedic and EMT program performance on certification examinations varies by program size and geographic location. *Prehospital Emergency Care*, 26(5), 673–681. <https://doi.org/10.1080/10903127.2021.1980163>
- Powell, J. R., Cash, R. E., Rivard, M. K., & Panchal, A. R. (2021). EMS program graduates who did not retest after initial attempt on the national certification exam. *Prehospital Emergency Care*, 26(5), 664–672. <https://doi.org/10.1080/10903127.2021.1943579>
- Renkiewicz, G. K., & Hubble, M. W. (2015). The attrition condition: Use of a preparatory course to reduce EMT course attrition and improve performance on North Carolina certification exams. *Prehospital Emergency Care*, 19(2), 260–266. <https://doi.org/10.3109/10903127.2014.967429>
- Russ-Eft, D. F., Dickison, P., & Levine, R. (2010). Taking the pulse of training transfer: Instructor quality and EMT certification examination results. *Human Resource Development Quarterly*, 21(3), 291–306. <https://psycnet.apa.org/doi/10.1002/hrdq.20052>
- Woodward, K. F., Hanson, C. S., Frogner, B. K., & Patterson, D. G. (2025). Who Is Leaving the Emergency Medical Services Workforce? *Journal of Public Health Management & Practice*, 31(5), 818–827. <https://doi.org/10.1097/phh.0000000000002175>