

**Title:** A Comparison of Volunteer and Paid EMS Professionals in West Virginia.

**Authors:** Courtney Harrison, MS<sup>1</sup>; Michael Mills, DO, FACEP<sup>2</sup>; Melissa Raynes, MS<sup>2</sup>; Sean Kaye, BA, EMT-P<sup>1</sup>; Jenny Kagarise Wilson, BA, EMT-B<sup>1</sup>; Antonio R. Fernandez, PhD, NRP, FAHA<sup>1</sup>

**Introduction:** Volunteer personnel represent a significant portion of the EMS workforce. Volunteer EMS providers sometime struggle to obtain required continuing medical education and may not gain as much experience caring for patients as career EMS providers. Therefore it is unknown if volunteer providers administer the same level of care as paid EMS providers. There is little research comparing paid and volunteer EMS providers. This study focused on the comparisons of care provided to EMS patients based on EMS provider pay status (volunteer vs. paid).

**Objective:** To compare prehospital care provided to 9-1-1 EMS patients by volunteer and paid EMS professionals in West Virginia.

**Methods:** This retrospective observational study assessed all 9-1-1 calls and EMS provider data for West Virginia in 2016. This information was obtained via Prehospital Care Report (PCR) submissions that involved a paid or volunteer EMS provider listed as primary care provider. Specifically, this study did a comparative analysis of intubation and IV success rates as well as the number of attempts required for procedure success. This study also evaluated the number of times multiple sets of vital signs were documented. Comparisons were based on the EMS providers pay status (volunteer vs. paid) and, where relevant, stratified by certification level (Emergency Medical Technician, Advanced Care Technician, and Paramedic). EMS providers with a reported pay status of Part Time Paid and Part Time Unpaid Employee were removed from the analysis. Study data were obtained from the West Virginia State EMS Data System located within the EMS Performance Improvement Center at the University of North Carolina - Chapel Hill. A two-sample Wilcoxon rank-sum test was utilized to evaluate medications administered, IV attempts, and intubation attempts. Chi-squared and Fisher's exact tests, where appropriate, were used to analyze a statistically significant difference for the difference in IV and intubation success rates as well as the documentation of multiple sets of vital signs.

**Results:** There were 308,017 9-1-1 EMS calls in WV in 2016. There was a primary care provider listed on 178,171 calls (57.8%). Paid EMS providers were listed as the primary care provider on 94.3% (168,143) of these calls and volunteers were listed as primary care providers on 5.6% (10,028) of calls. Paid EMS providers attempted to place an IV 39,869 times with a success rate of 82.47%. Volunteer EMS providers attempted to place an IV 2,029 times with a success rate of 83.54%. When stratified by certification level, there was no statistically significant difference noted when comparing IV success rates between paid EMS providers and volunteer EMS providers ( $p>0.05$ ). The average number of attempts to successfully place an IV for paid EMS providers was 1.14 attempts (standard deviation 0.79) with a median of 1 attempt. The average number of attempts to successfully place an IV for volunteer EMS providers was 1.13 attempts (standard deviation 0.39) with a median of 1 attempt. When stratified by certification level, there was no statistically significant difference noted when comparing IV success rates between paid EMS providers and volunteer EMS providers ( $p>0.05$ ). There were 789 prehospital intubation attempts by paramedics in West Virginia. There were 749

intubation attempts by paid paramedics (94.93%) and 40 attempts by volunteers (5.07%). The overall intubation success rate was 72.75%. Paid paramedics had an intubation success rate of 73.16% and volunteer paramedics had an intubation success rate of 65.00% ( $p=0.259$ ). There was no statistically significant difference noted when evaluating the number of attempts before a successful intubation (0.53). The average number intubation attempts for a successful intubation for paid EMS provider was 1.20 (standard deviation 0.50) with a median of 1 attempt. The average number intubation attempts for a successful intubation for volunteer EMS providers was 1.14 (standard deviation 0.41) with a median of 1 attempt. When evaluating the documentation of multiple sets of vital signs, paid EMS providers recorded no vital signs on 7.00% of the time. One set of vitals was recorded 23.84% of the time, and at least two sets of vitals were recorded 69.16% of the time. Volunteer EMS providers recorded no vital signs on 5.04% of the time. One set of vitals was recorded 10.95% of the time, and at least two sets of vitals were recorded 84.02% of the time. The difference in the recording of multiple vital signs between paid and volunteer EMS providers was statistically significant ( $p<0.001$ ).

**Conclusion:** When evaluating IV success rates, intubation success rates, and the number of attempts required to successfully initiate these interventions, there was no statistically significant differences noted between paid and volunteer EMS providers. This result suggests that volunteers and paid EMS providers have similar levels of skill when performing common patient care procedures. Furthermore, volunteer EMS providers had a higher percentage of calls where at least two sets of vital signs were recorded. This study suggests that volunteer EMT, ACT, and Paramedics patient care performance is comparable to paid EMS providers. Further study should attempt to evaluate patient outcomes for those who were cared for by paid or volunteer providers.

<sup>1</sup>EMS Performance Improvement Center, Department of Emergency Medicine, School of Medicine, University of North Carolina – Chapel Hill, Chapel Hill, North Carolina, USA

<sup>2</sup>West Virginia Office of Emergency Medical Services, West Virginia Bureau for Public Health, Charleston, West Virginia, USA