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# A National Description of Violence toward Emergency Medical Services Personnel

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# ORIGINAL CONTRIBUTIONS

## A NATIONAL DESCRIPTION OF VIOLENCE TOWARD EMERGENCY MEDICAL SERVICES PERSONNEL

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ABSTRACT

**Introduction:** EMS personnel often work in unpredictable environments and are at high risk for sustaining occupational injuries. One potential source of injury that is of growing concern is violence toward EMS personnel. **Objective:** To describe the prevalence of violence directed at EMS personnel by type and source, and to identify characteristics associated with experiencing violence. **Methods:** The 2013 Longitudinal EMT Attributes and Demographics Study contained 14 items assessing violence experienced in the past 12 months. Violence was categorized by type (physical or verbal) and by source (the patient or a patient's family member or bystander). EMS personnel characteristics included sex, age, race, marital status, certification level, firefighter, volunteerism, agency type, and community size. Descriptive and comparative analyses were performed on personnel whose primary role was providing patient care. Multivariable logistic regression modelling was used to assess associations between provider characteristics and experiencing violence. **Results:** A total of 2,515/4,238 (59.3%) responses were received and 1,789 met inclusion criteria. Over two-thirds (69.0%) experienced at least one form of violence in the past 12 months. Verbal violence was more prevalent than physical (67.0% vs. 43.6%). Using multivariable logistic regression to control for other demographic and employment characteristics, paramedics had nearly triple the odds of experiencing physical (OR = 2.67, 95% CI = 2.06–3.46) and verbal (OR = 2.63, 95% CI = 1.99–3.46) violence as EMTs. Urban personnel had increased odds of experiencing physical (OR = 1.53, 95% CI = 1.21–1.93) and verbal violence (OR = 1.32, 95% CI = 1.02–1.71). Each additional weekly transport increased the odds of experiencing physical (OR = 1.04, 95% CI = 1.03–1.05) and verbal (OR = 1.04, 95% CI = 1.03–1.06) violence by 4%. Those who were volunteers at their main EMS jobs had decreased odds of experiencing physical (OR = 0.68, 95% CI = 0.50–0.92) and verbal (OR = 0.59, 95% CI = 0.44–0.78) violence. **Conclusions:** Over two-thirds of EMS personnel experienced at least one form of violence in the last 12 months. Demographic and employment characteristics associated with experiencing violence were identified. Our findings may be used in education initiatives to raise awareness of the high prevalence of violence toward EMS personnel and factors associated with experiencing violence.
**Key words:** emergency medical technicians; paramedics; violence

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## INTRODUCTION

Emergency medical services (EMS) personnel deliver life-saving care to patients in unpredictable environments that include myriad risks, such as injury or illness from hazardous scenes, exposures to infectious diseases, and collisions in ground ambulances.[1–6] In one study, Maguire and Smith demonstrated that work-related injuries among EMS personnel were three times higher than the national average for all other occupations.[7] Similarly, data from the Bureau of Labor Statistics for 2012 indicated the non-fatal occupational injury and illness rate involving days away from work was greater than any other health profession, and 24% higher than the next highest group (nursing, psychiatric, and home health aides).[8] A growing area of concern is injuries sustained as a result of violence toward EMS personnel while on the job.[1,3]

Previous studies in Canada and Australia have shown that 75–88% of personnel reported experiencing occupational violence within the preceding 12 months.[9,10] In studies that surveyed EMS personnel

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in various jurisdictions throughout the United States between 61–93% of personnel reported having experienced violence during their EMS career.[11–13] EMS personnel frequently experience verbal abuse, physical assaults, and intimidation.[9–14] The frequency of violence-related EMS incidents ranged from 0.8–5.0% of all dispatched calls.[14,15] Furthermore, one study reported that the relative risk of physical assaults that resulted in a day or more of missed work for EMS personnel was twice the national average of all workers.[7] Verbal abuse is the form of violence most often reported by EMS personnel.[10,11,14] Physical assaults typically occur during patient care activities,[15] and patients are often reported as the most common perpetrators.[9,11,14] Nevertheless, some studies have demonstrated that non-patients also initiate violence toward EMS personnel.[11,14,16]

While no previous national studies of violence toward EMS professionals have been conducted, the high proportions of EMS personnel who reported experiencing violence in studies of individual agencies and systems warrants further investigation. The primary objective of this study was to describe the prevalence of physical and verbal violence and to describe the sources of violence directed toward EMS personnel in the United States EMS workplace by analyzing the experiences of a cohort of nationally-certified EMS personnel. A secondary objective was to explore characteristics of EMS personnel and their workplace environment that may predict experiencing verbal or physical violence.

# METHODS

## Population and Study Design

The National Registry of Emergency Medical Technicians (NREMT) conducted the first Longitudinal EMT Attributes and Demographics Study (LEADS) from 1999 to 2008, which focused on describing individuals who provided prehospital care throughout the United States.[17,18] LEADS II is also a ten year longitudinal study, and began the data collection effort in 2013. Recruitment for the cohort consisted of randomly-selected, newly-certified Emergency Medical Technicians (EMTs) and paramedics who agreed to participate. The American Institutes for Research Institutional Review Board approved this project.

The LEADS II questionnaire consisted of validated items from the first LEADS project,[17,18] items from the Behavioral Risk Factor Surveillance System (BRFSS),[19] and standardized definitions from the National Emergency Medical Services Workforce Data Definitions.[20] It also included new questions, administered in the 2013 Longitudinal Survey, relating to violence experienced in the EMS workplace in the preceding 12 months. All new items added to the questionnaire were cognitively tested with practicing EMTs and paramedics and revised as appropriate.

The study population was a sample of 4,238 nationally certified EMS personnel who participated in the 2013 iteration of the second LEADS project. Participants were asked to respond to an annually-administered electronic questionnaire. Following a modified Dillman's tailored design method,[21] two follow-up reminder e-mails were sent asking participants to complete the questionnaire. Completion of this questionnaire had no bearing on an individual's National EMS Certification status.

## Variable Descriptions

The outcome variables of interest were constructed from a series of 14 items assessing violence experienced by EMS personnel within the past 12 months. Individuals were asked to indicate whether or not they had experienced each of the following seven types of violence from a patient: (1) cursing or making threats; (2) punching, slapping, or scratching; (3) spitting; (4) biting; (5) being struck with an object; (6) stabbing or stabbing attempts; and (7) shooting or shooting attempts. Individuals were then asked to indicate whether or not they experienced each of these seven types of violence from a patient's family member or bystander. As our interest was the prevalence of violence rather than incidence, we did not ask about the number of times each type of violence was experienced.

For comparative analyses, four violence variables were created: physical violence by a patient (PVP), physical violence by a patient's family member or a bystander (PVFB), verbal violence by a patient (VVP), and verbal violence by a patient's family member or a bystander (VVFB). Finally, an overall violence variable was created for individuals who experienced at least one type of violence in the past 12 months. For the logistic regression models violence was dichotomized by type, either physical or verbal.

Demographic variables of interest included sex (male or female), age, race (divided into white, non-Hispanic or other), and marital status (married or not married). Employment variables of interest included provider level (EMT or paramedic), years of experience, firefighter at main EMS job (yes or no), volunteer at main EMS job (yes or no), agency type (9-1-1 response or other), community size [rural (fewer than 75,000 residents), or urban (75,000 residents or more)], and weekly number of transports.

## Data Analysis

Data were collected using Snap 10 web-based software (Snap Surveys Ltd, Portsmouth, NH). Data were stripped of all personally identifiable information and

analyses were performed using SAS Version 9.3 (SAS Institute, Cary, NC). To be included in the analyses, EMS personnel had to select "patient care provider" as their primary role at their main EMS job; those who did not report "patient care provider" as their primary role were excluded. Individuals who worked for the military were also excluded since their experience likely differs greatly from that of civilian EMS personnel.

Descriptive statistics were calculated that included frequencies, means, and medians. Standard deviations were calculated for normally distributed continuous variables; interquartile ranges (IQR) were calculated for all other continuous variables. Demographic and employment characteristics of those who experienced each of the four types of violence (PVP, PVFB, VVP, or VVFB) were compared to those of individuals who did not experience each type of violence, using Chi-square tests, t-tests, and Wilcoxon rank sum tests ($\alpha = 0.05$). Multivariable logistic regression models for physical and verbal violence were created using variables that were significant for at least one of the four types of violence in the comparative analyses. Results are expressed as odds ratios (OR) with their 95% confidence intervals (95% CI). Finally, the Hosmer-Lemeshow goodness-of-fit test was performed to assess model fit.[22]

Item non-response ranged from 0.0%–4.5% (for the yes/no item asking about being bitten by a patient's family member or bystander). Reported percentages were calculated using the numbers of individuals responding to the item as the denominator.

## Results

Responses were returned from 2,515 of 4,238 (59.3%) EMS personnel, and of these respondents, 1,789 met the inclusion criteria. Table 1 summarizes the demographic and employment characteristics of all respondents in these analyses. The majority were male (67.8%) and white (88.6%) and almost half (46.8%) were married. They ranged in age from 18 to 70 with an average age of 32.3 years (SD = 10.4). Roughly half (51.8%) were paramedics and half (48.2%) were EMTs. Their median years of experience as an EMS provider was 3.5 years (IQR = 5.5). Most were employed by a service with 9-1-1 response capabilities (81.5%), worked in a rural area of less than 75,000 people (59.9%), and performed a median of 7 transports per week (IQR = 11.5). About a quarter reported working as a volunteer (26.9%) or a firefighter (29.0%) at their main EMS job.

Table 2 displays the overall prevalence of violence experienced by EMS personnel over the past 12 months. Over two-thirds (69.0%) of personnel reported experiencing at least one type of violence. Ver-

Table 1. Respondent demographic and employment characteristics[†]

| | Results | |
|---|---|---|
| Variable | *n* | Mean (*SD*) |
| Age | 1,777 | 32.3 (10.4) |
| | *n* | Median (IQR) |
| Years of Experience | 1,788 | 3.5 (5.5) |
| Weekly Transports | 1,731 | 7.0 (11.5) |
| | *n* | % |
| Sex | | |
| Male | 1,210 | 67.8% |
| Female | 576 | 32.2% |
| Race | | |
| White | 1,554 | 88.6% |
| Other | 201 | 11.4% |
| Marital Status | | |
| Married | 833 | 46.8% |
| Not Married | 948 | 53.2% |
| Provider Level | | |
| EMT | 863 | 48.2% |
| Paramedic | 926 | 51.8% |
| Firefighter | | |
| Yes | 506 | 29.0% |
| No | 1,237 | 71.0% |
| Volunteer | | |
| Yes | 470 | 26.9% |
| No | 1,276 | 73.1% |
| Agency Type | | |
| 9-1-1 Response | 1,420 | 81.5% |
| Other | 322 | 18.5% |
| Community Size | | |
| Urban (≥ 75,000) | 698 | 40.1% |
| Rural (< 75,000) | 1,044 | 59.9% |

[†]Counts within individual characteristics may not add up to total number of respondents as a result of item non-response.

Table 2. Overall prevalence of violence experienced by EMS personnel during twelve months

| Variable | *n* | % |
|---|---|---|
| Overall Violence* | 1,205 | 69.0 |
| Verbal Violence (VVP, VVFB) | 1,168 | 67.0 |
| Physical Violence** (PVP, PVFB) | 760 | 43.6 |
| Punching, slapping, or scratching | 574 | 32.9 |
| Spitting | 515 | 29.6 |
| Biting | 192 | 11.1 |
| Struck with an object | 154 | 8.9 |
| Stabbing or stabbing attempts | 35 | 2.0 |
| Shooting or shooting attempts | 21 | 1.2 |

*This category represents the number of individuals who experienced one or more of the specific types of violence listed.

**This category represents the number of individuals who experienced one or more of the specific types of physical violence listed.

bal violence was more prevalent among EMS personnel (67.0%), and less than half (43.6%) experienced one or more forms of physical violence. Punching, slapping, or scratching was the most commonly reported type of physical violence (32.9%), followed by spitting (29.6%), biting (11.1%), and being struck with an object (8.9%). The least frequent types of physical violence experienced by EMS personnel were stabbing or stabbing attempts (2.0%) and shooting or shooting attempts (1.2%). Overall, all types of violence most often originated from the patient. The proportion of personnel who experienced physical violence from a patient (43.4%) was over 7 times the proportion experiencing physical violence from a patient's family member or bystander (5.8%). Likewise, the proportion of personnel who experienced verbal violence from a patient (65.8%) was substantially greater than the proportion that experienced verbal violence from a patient's family member or bystander (36.8%).

## Physical Violence

Tables 3 and 4 summarize the frequencies of demographic and employment characteristics by the type of violence experienced. Personnel who experienced physical violence from a patient (PVP) were less likely to be married (46.7% vs. 39.4%, $\chi^2 = 19.4$, $p < 0.01$) and were on average 1.9 years younger than those who did not experience PVP in the last 12 months (31.3 vs. 33.2, $p < 0.001$). The provider's race/ethnicity was not significantly associated with PVP. Over twice as many paramedics experienced PVP as EMTs (58.3% vs. 27.2%, $\chi^2 = 1172.2$, $p < 0.0001$). PVP was experienced by fewer of those working as a firefighter (36.5% vs. 46.2%, $\chi^2 = 113.6$, $p < 0.001$) or as a volunteer (20.9% vs. 51.7%, $\chi^2 = 1133.2$, $p < 0.0001$) at their main EMS job. Personnel who experienced PVP had more than double the median years of experience (3.5 vs. 1.5, $p < 0.0001$), were most often working in an urban community (56.1% vs. 35.0%, $\chi^2 = 175.9$, $p < 0.0001$), and had more than double the median number of weekly transports (14.5 vs. 7.0, $p < 0.0001$).

Those who experienced physical violence from a patient's family member or bystander (PVFB) were less likely to be married (7.5% vs. 3.8%, $\chi^2 = 111.0$, $p < 0.001$). Race/ethnicity was not significantly associated with PVFB, and while age was a significant factor in PVP, no significant differences were found for PVFB. More than twice as many paramedics experienced PVFB as EMTs (8.2% vs. 3.1%, $\chi^2 = 120.7$, $p < 0.0001$), and fewer of those working as volunteers experienced PVFB (2.1% vs. 7.1%, $\chi^2 = 115.5$, $p < 0.0001$). Those who experienced PVFB had nearly double the median years of experience (6.0 vs. 3.5, $p < 0.0001$),

TABLE 3. Prevalence of violence experienced during twelve months, by type of violence and respondent characteristics†

| | Type of Violence | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | PVP | | PVFB | | VVP | | VVFB | |
| Respondent Characteristics | *n* | % | *n* | % | *n* | % | *n* | % |
| Overall | 756 | 43.4 | 100 | 5.8 | 1,145 | 65.8 | 638 | 36.8 |
| Sex | | | | | | | | |
| Male | 509 | 43.1 | 70 | 5.9 | 799 | 67.8* | 460 | 39.2** |
| Female | 245 | 43.7 | 30 | 5.4 | 345 | 61.9* | 178 | 31.9** |
| Race | | | | | | | | |
| White | 658 | 43.5 | 91 | 6.0 | 995 | 65.9 | 561 | 37.3 |
| Other | 84 | 42.9 | 7 | 3.6 | 130 | 66.7 | 66 | 33.7 |
| Marital Status | | | | | | | | |
| Married | 321 | 39.4** | 31 | 3.8*** | 512 | 62.9* | 279 | 34.4* |
| Not Married | 430 | 46.7** | 69 | 7.5*** | 628 | 68.5* | 357 | 39.0* |
| Provider Level | | | | | | | | |
| EMT | 228 | 27.2**** | 26 | 3.1**** | 417 | 49.8**** | 187 | 22.4**** |
| Paramedic | 528 | 58.3**** | 74 | 8.2**** | 728 | 80.8**** | 451 | 50.2**** |
| Firefighter | | | | | | | | |
| Yes | 184 | 36.5*** | 22 | 4.4 | 317 | 62.8 | 172 | 34.4 |
| No | 570 | 46.2*** | 77 | 6.3 | 825 | 67.1 | 465 | 37.8 |
| Volunteer | | | | | | | | |
| Yes | 98 | 20.9**** | 10 | 2.1**** | 195 | 41.6**** | 87 | 18.6**** |
| No | 658 | 51.7**** | 90 | 7.1**** | 950 | 74.9**** | 551 | 43.6**** |
| Agency Type | | | | | | | | |
| 9-1-1 Response | 611 | 43.1 | 90 | 6.4** | 945 | 66.8 | 549 | 38.9**** |
| Other | 141 | 43.9 | 9 | 2.8** | 196 | 61.4 | 85 | 26.8**** |
| Community Size | | | | | | | | |
| Urban (≥ 75,000) | 391 | 56.1**** | 51 | 7.3* | 525 | 75.8**** | 303 | 43.6**** |
| Rural (< 75,000) | 364 | 35.0**** | 48 | 4.6* | 619 | 59.5**** | 334 | 32.3**** |

*$p < 0.05$. **$p < 0.01$. ***$p < 0.001$. ****$p < 0.0001$.
†Counts within individual characteristics may not add up to overall totals as a result of item non-response.

Table 4. Prevalence of continuous respondent characteristics by type of violence experienced during twelve months

| | Type of Violence | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | PVP | | PVFB | | VVP | | VVFB | |
| Respondent Characteristics | *n* | % | *n* | % | *n* | % | *n* | % |
| Overall | 756 | 43.4% | 100 | 5.8% | 1,145 | 65.8% | 638 | 36.8% |
| | *n* | Mean (*SD*) | *n* | Mean (*SD*) | *n* | Mean (*SD*) | *n* | Mean (*SD*) |
| Age | | | | | | | | |
| Experienced Violence Type | 749 | 31.3 (9.3)*** | 99 | 30.3 (9.1) | 1,138 | 31.7 (9.8)* | 635 | 30.9 (9.1)*** |
| Did Not Experience Violence Type | 988 | 33.2 (11.2)*** | 1,639 | 32.5 (10.5) | 594 | 33.5 (11.5)* | 1,096 | 33.1 (11)*** |
| | *n* | Median (IQR) | *n* | Median (IQR) | *n* | Median (IQR) | *n* | Median (IQR) |
| Years of Experience | | | | | | | | |
| Experienced Violence Type | 756 | 3.5 (4.5)**** | 100 | 6.0 (6.0)**** | 1,145 | 3.5 (4.5)**** | 638 | 3.5 (4.5)**** |
| Did Not Experience Violence Type | 988 | 1.5 (5.5)**** | 1,639 | 3.5 (5.5)**** | 594 | 1.5 (3.0)**** | 1,096 | 1.5 (5.5)**** |
| Weekly Transports | | | | | | | | |
| Experienced Violence Type | 756 | 14.5 (17.5)**** | 100 | 14.5 (27.5)**** | 1,145 | 14.5 (17.5)**** | 638 | 14.5 (17.5)**** |
| Did Not Experience Violence Type | 988 | 3.0 (13.5)**** | 1,639 | 7.0 (11.5)**** | 594 | 3.0 (7.0)**** | 1,096 | 7.0 (13.5)**** |

*p < 0.05. **p < 0.01. ***p < 0.001. ****p < 0.0001.

worked in an urban community (7.3% vs 4.6%, $\chi^2 = 15.7$, $p < 0.05$), and had double the weekly transport volume (14.5 vs 7.0, $p < 0.0001$). While agency type was not significantly associated with PVP, twice the number of personnel working for an agency with 9-1-1 response capabilities experienced PVFB (6.4% vs. 2.8%, $\chi^2 = 6.1$, $p < 0.01$).

The results of the multivariable logistic regression model for physical violence are presented in Table 5. Race was not included as a factor in the final logistic model because it was not related to any other variables in previous analyses. Six factors associated with a significant experience of both PVP and PVFB in the comparative analysis were significant in the logistic regression model: marital status, provider level, years of experience, volunteerism, community size, and weekly transports. Although not significantly associated with either type of physical violence in the comparative analyses, after controlling for covariates, female personnel were found to have increased odds of experiencing physical violence (OR = 1.33, 95% CI = 1.04–1.69). Unmarried personnel also had increased odds of experiencing physical violence (OR = 1.34, 95% CI = 1.05–1.71). Paramedics had nearly three times the odds of experiencing physical violence as EMTs (OR = 2.67, 95% CI = 2.06–3.46), while volunteer personnel had significantly lower odds of experiencing physical violence (OR = 0.68, 95% CI = 0.50–0.92). Those working in an urban community had increased odds of experiencing physical violence (OR = 1.53, 95% CI = 1.21–1.93), and each additional weekly transport increased the odds of experiencing physical violence by 4% (OR = 1.04, 95% CI = 1.03–1.05). While significant in the PVFB comparative statistics, there was no significant difference in the odds of experiencing physical violence between agency types. The physical

violence model exhibited a good fit, as demonstrated by the Hosmer-Lemeshow goodness-of-fit test[22]: ($\chi^2 = 4.97$, $p = 0.761$).

## Verbal Violence

Verbal violence from a patient (VVP) was experienced by a significantly greater proportion of males (67.8% vs. 61.9%, $\chi^2 = 5.7$, $p < 0.05$) and by those who were not married (68.5% vs. 62.9%, $\chi^2 = 16.0$, $p < 0.05$). Personnel experiencing verbal violence were, on average, 1.8 years younger (31.7 vs. 33.5, $p < 0.05$). Race/ethnicity was not significantly associated with VVP. VVP was experienced more by paramedics than EMTs (80.8% vs. 49.8%, $\chi^2 = 1186.0$, $p < 0.0001$) and experienced by fewer of those working as a volunteer (41.6% vs. 74.9%, $\chi^2 = 1169.4$, $p < 0.0001$). Personnel who experienced VVP had nearly double the median years of experience (3.5 vs. 1.5, $p < 0.0001$), were more likely to work in an urban community (75.8% vs. 59.5%, $\chi^2 = 148.9$, $p < 0.0001$), and had nearly five times the weekly transport volume (14.5 vs. 3.0, $p < 0.0001$).

All factors that were significantly associated with VVP were similarly associated with experiencing verbal violence from a patient's family member or bystander (VVFB), as seen in Table 3 and Table 4. VVFB was experienced by more males (39.2% vs. 31.9%, $\chi^2 = 8.7$, $p < 0.01$) and unmarried personnel (39.0% vs. 34.4%, $\chi^2 = 13.9$, $p < 0.05$). Those experiencing VVFB were, on average, 2.2 years younger (30.9 vs. 33.1, $p < 0.001$). The race/ethnicity of the provider was not significantly associated with experiencing VVFB. VVFB was experienced by twice as many paramedics as EMTs (50.2% vs. 22.4%, $\chi^2 = 1143.6$, $p < 0.0001$), and experienced by fewer of those working as a volunteer (18.6% vs. 43.6%, $\chi^2 = 192.4$, $p < 0.0001$). Those who experienced VVFB had twice the median years of experience (3.5 vs. 1.5, $p < 0.0001$), were more likely to work in an urban community (43.6% vs. 32.3%, $\chi^2 = 122.7$, $p < 0.0001$) and had double the weekly transport volume (14.5 vs. 7.0, $p < 0.0001$). While no significant differences in agency type were found for VVP, VVFB was experienced by significantly more personnel who worked for an agency providing 9-1-1 response (38.9% vs. 26.8%, $\chi^2 = 116.3$, $p < 0.0001$).

Table 5 illustrates the results of the multivariable logistic regression model for verbal violence. As mentioned previously, race/ethnicity was not included. Five factors significantly associated with VVP and VVFB in the comparative analysis were also significant in these analyses. However, while significant in the comparative analysis for VVP and VVFB, after controlling for covariates, sex and age had no significant impact on the odds of a provider experiencing verbal violence. Unmarried personnel had significantly increased odds of experiencing verbal violence (OR = 1.35, 95%, CI = 1.04–1.74). Paramedics had nearly triple the odds of experiencing verbal violence (OR = 2.63, 95% CI = 1.99–3.46), while those working as a volunteer had significantly decreased odds (OR = 0.59, 95% CI = 0.44–0.78). Personnel were at increased odds of experiencing verbal violence if they worked in an urban community (OR = 1.32, 95% CI = 1.02–1.71), worked for an agency providing 9-1-1 response (OR = 1.47, 95% CI = 1.08–1.99) or transported a higher number of weekly transports; each additional weekly transport increased the odds of experiencing verbal violence by 4% (OR = 1.04, 95% CI = 1.03–1.06). The verbal violence model exhibited a good fit, as demonstrated by the Hosmer-Lemeshow goodness-of-fit test[22]: ($\chi^2 = 13.89$, $p = 0.085$).

# DISCUSSION

This is the first study to identify the prevalence of physical and verbal violence, sources of violence and the factors associated with experiencing violence in a national EMS cohort. Over two-thirds of EMS personnel in this study experienced at least one form of violence within the past 12 months. As supported by previous literature, verbal violence was the most prevalent form of violence experienced.[10,11,13,14,23] Prior studies also support the finding that the patient is most often identified as the source of violence.[9,11,14,23,24] Both of these findings are further supported by studies of occupational violence conducted in hospital emergency departments.[25,26] While many studies report results on violence initiated by the patient, this was the first study to explore types of violence initiated by both patients and non-patients (patient's family members or bystanders).

Table 6 summarizes the relationships between the provider characteristics and each type of violence in the comparative and logistic analyses. Five characteristics (one demographic and four employment variables) were significantly associated with experiencing both physical and verbal violence. Marital status was the only demographic characteristic that was significant in all four types of violence and confirmed by both logistic analyses; unmarried personnel experienced more of each type of violence than married personnel. In 2014, Bureau of Justice Statistics data indicated the prevalence of violent crime was statistically significantly lower for married individuals (0.6%) than for individuals who were never married (1.6%), divorced (1.6%), or separated (3.0%).[27] In a discussion of a study showing that married nurses in Taiwan experienced less workplace violence, Gillespie et al. posited that that those who are married may be more accustomed to working with others toward a mutual understanding.[28] Further research is needed to explore whether this reason-

TABLE 5. Multivariable logistic regression models for physical and verbal violence experienced by EMS personnel during twelve months

| Variable | Physical Violence OR (95% CI) | Verbal Violence OR (95% CI) |
|---|---|---|
| Sex | | |
| Male | 1.00 | 1.00 |
| Female | 1.33 (1.04–1.69)* | 0.96 (0.75–1.23) |
| Age | 0.98 (0.97–0.99)** | 0.99 (0.98–1.01) |
| Marital Status | | |
| Married | 1.00 | 1.00 |
| Not Married | 1.34 (1.05–1.71)* | 1.35 (1.04–1.74)* |
| Provider Level | | |
| EMT | 1.00 | 1.00 |
| Paramedic | 2.67 (2.06–3.46)**** | 2.63 (1.99–3.46)**** |
| Years of Experience | 1.03 (1.01–1.06)* | 1.01 (0.98–1.03) |
| Firefighter | | |
| No | 1.00 | 1.00 |
| Yes | 0.94 (0.72–1.21) | 1.12 (0.86–1.47) |
| Volunteer | | |
| No | 1.00 | 1.00 |
| Yes | 0.68 (0.50–0.92)* | 0.59 (0.44–0.78)*** |
| Agency Type | | |
| Other | 1.00 | 1.00 |
| 9-1-1 Response | 1.13 (0.84–1.51) | 1.47 (1.08–1.99)* |
| Community Size | | |
| Rural | 1.00 | 1.00 |
| Urban | 1.53 (1.21–1.93)*** | 1.32 (1.02–1.71)* |
| Weekly Transports | 1.04 (1.03–1.05)**** | 1.04 (1.03–1.06)**** |

*$p < 0.05$. **$p < 0.01$. ***$p < 0.001$. ****$p < 0.0001$.

TABLE 6. Summary of relationships of provider characteristics and types of violence in comparative and multivariable logistic regression analyses

| | Comparative Analyses | | | | Multivariable Regression Analyses | |
|---|---|---|---|---|---|---|
| | PVP | PVFB | VVP | VVFB | Physical Violence | Verbal Violence |
| Sex | n.s. | n.s. | * | * | * | n.s. |
| Age (Mean) | *** | n.s. | * | *** | ** | n.s. |
| Race | n.s. | n.s. | n.s. | n.s. | — | — |
| Marital Status | ** | *** | * | * | * | * |
| Provider Level | **** | **** | **** | **** | **** | **** |
| Years of Experience (Median) | **** | **** | **** | **** | * | n.s. |
| Firefighter | *** | n.s | n.s. | n.s. | n.s. | n.s. |
| Volunteer | **** | **** | **** | **** | * | *** |
| Agency Type | n.s. | ** | n.s. | **** | n.s. | * |
| Community Size | **** | * | **** | **** | *** | * |
| Weekly Transports (Median) | **** | **** | **** | **** | **** | **** |

*$p < 0.05$. **$p < 0.01$. ***$p < 0.001$. ****$p < 0.0001$.
Factors that were not statistically significant are indicated by "n.s."

ing extends to the population of EMS personnel in the United States.

Provider level was significant in both analyses; paramedics had greater odds of experiencing violence than EMTs, which mirrors others' findings.[29] Volunteerism was also significant in both analyses; volunteers experienced proportionately less violence than those who were paid personnel. As volunteers are not traditionally the subject of EMS research studies, this finding could benefit from further research.

Community size and number of weekly transports were significant in both logistic analyses; those working in an urban community and those with a higher number of weekly transports experienced more violence. Previous literature supports the finding that personnel working in urban settings have greater odds of experiencing both physical and verbal violence.[10,14]

As a higher number of transports would allow EMS personnel more opportunities to experience violence, it seems logical that those with a higher number of weekly transports experience more violence.

The variables sex, age, and years of experience were associated with an increased incidence of physical but not verbal violence. We found that female personnel were at greater odds of experiencing physical violence than were their male counterparts, which matches findings from previous studies.[9,10] Also in line with previous investigations, we found the odds of experiencing physical violence decreases as age increases.[9,28] However, our finding that experiencing physical violence within the past 12 months increased with years of experience on the job is contrary to previous studies, where the total number of violent acts experienced increased with years on the job, while the incidence of violence per each additional year on the job decreased.[28]

The findings of our study may be used by stakeholders to guide future educational efforts about the risk of violence toward EMS personnel. Although the 2009 National EMS Education Standards address the importance of recognizing and removing oneself from a violent environment, an additional topic should be added to focus on the prevalence, types of violence and sources of violence which are currently not discussed.[30] The findings of this study provide a baseline estimate of the prevalence of different types of violence from patients or a patient's family members or bystanders toward nationally certified EMS personnel across the nation. Furthermore, demographic and employment characteristics significantly associated with the odds of experiencing violence were identified that could be used to target future initiatives toward reducing violence against EMS personnel.

## LIMITATIONS

We analyzed data from a survey of nationally certified EMS personnel participating in the LEADS longitudinal study. Although National EMS Certification is required in 46 states,[31] there are nationally certified EMS personnel in every state, which favors generalizability.

In our study, 51.8% of the respondents were paramedics, compared to 24.8% paramedics in the nationally certified EMT and paramedic population.[31] As the data were not weighted to reflect the overall composition of the nationally certified EMT and paramedic workforce, the prevalence of violence may be overestimated due to the proportionately larger number of paramedics than EMTs in the sample.

There is the possibility of information bias, as personnel may not have been able to recall all instances of violence occurring over the past 12 months. Bias may also stem from inconsistent determinations of which patients were violent based on the intent of the patient.[16] For example, personnel may not have reported violence from a patient whose intent was affected by their medical condition, such as hypoglycemia or a traumatic brain injury. Conversely, telescoping could result in over-reporting. Telescoping refers to a tendency for people to estimate when something happened based on how easily they can recall information regarding it.[33] Memorable events, such as violence, are easily remembered and will seem more recent than other events occurring at about the same time.[34] Nevertheless, we believe that all personnel would be equally affected by these factors, and we do not suspect that there has been any differential misclassification bias among the groups in our study.

Our study assessed the prevalence of violence originating from patients, family members and bystanders. Any episodes of violence from other sources such as co-workers, other healthcare providers and former friends were not captured.

## CONCLUSIONS

We utilized data from a cohort of nationally certified EMS personnel to provide a national baseline of the prevalence of several types of physical and verbal violence experienced as well as the sources of violence. Over two-thirds of EMS personnel experienced at least one form of violence in the last 12 months. Verbal violence was the most common type of violence experienced and patients were the most common source of violence. Demographic and employment characteristics associated with experiencing physical and verbal violence in the prehospital environment were identified. Our findings may be used in education initiatives to raise awareness of the high prevalence of violence toward EMS personnel and factors associated with experiencing violence. Meanwhile, future research is needed to estimate the incidence of violence and to better understand the factors that cause patients and bystanders to become violent in order to increase the knowledge, skills, and abilities of EMS personnel to manage and prevent violence in the prehospital setting.

## References

1. Reichard AA, Marsh SM, Moore PH. Fatal and nonfatal injuries among emergency medical technicians and paramedics. Prehosp Emerg Care. 2011;15:511–7.
2. Reichard AA, Jackson LL. Occupational injuries among emergency responders. Am J Ind Med. 2010;53:1–11.
3. Heick R, Young T, Peek-Asa C. Occupational injuries among emergency medical service providers in the United States. J Occup Environ Med. 2009;51:963–8.
4. Studnek JR, Ferketich A, Crawford JM. On the job illness and injury resulting in lost work time among a national cohort of emergency medical services personnel. Am J Ind Med. 2007;50:921–31.

5. Maguire BJ, Hunting KL, Smith GS, Levick NR. Occupational fatalities in emergency medical services: a hidden crisis. Ann Emerg Med. 2002;40:625–32.
6. Gershon RRM, Vlahov D, Kelen G, Conrad B, Murphy L. Review of accidents/injuries among emergency medical services workers in Baltimore, Maryland. Prehosp Disaster Med. 1993;10(1):33–7.
7. Maguire BJ, Smith S. Injuries and fatalities among emergency medical technicians and paramedics in the United States. Prehosp Disaster Med. 2013;28(4):1–7.
8. U.S. Department of Labor, Bureau of Labor Statistics. Available at: http://data.bls.gov/gqt/InitialPage. Accessed on September 17, 2015.
9. Bigham BL, Jensen JL, Tavares W, et al. Paramedic self-reported exposure to violence in the EMS workplace: a mixed-methods cross-sectional survey. Prehosp Emerg Care. 2014;18(4): 489–94.
10. Boyle M, Koritsas S, Coles J, Stanley J. A pilot study of workplace violence towards paramedics. Emerg Med J. 2007;24:760–3.
11. Pozzi C. Exposure of prehospital providers to violence and abuse. J Emerg Nurs. 1998;24:320–3.
12. Corbett S, Grange J, Thomas T. Exposure of prehospital care providers to violence. Prehosp Emerg Care. 1998;2:127–31.
13. Sayah AJ, Thomsen TW, Eckstein M, Hutson HR. EMS providers and violence in the field. Ann Emerg Med. 1999;4:104.
14. Mock EF, Wrenn KD, Wright SW, Eustis TC, Slovis CM. Prospective field study of violence in emergency medical services calls. Ann Emerg Med. 1998;32:33–6.
15. Tintinalli JE. Violent patients and the prehospital provider. Ann Emerg Med. 1993;22:1276–9.
16. Mechem CC, Dickinson ET, Shofer FS, Jaslow D. Injuries from assaults on paramedics and firefighters in an urban emergency medical services system. Prehosp Emerg Care. 2002;6:396–401.
17. Brown WE Jr., Dickison PD, Misselbeck WJ, Levine R. Longitudinal Emergency Medical Technician Attribute and Demographic Study (LEADS): An interim report. Prehosp Emerg Care. 2002;6(4):433–9.
18. Dawson DE, Brown WE Jr., Harwell TS. Assessment of nationally registered emergency medical technician certification training in the United States: the LEADS project. Prehosp Emerg Care. 2003;7(1):114–9.
19. Nelson DE, Holtzman D, Bolen J, Stanwyck CA, Mack KA. Reliability and validity of measures from the Behavioral Risk Factor Surveillance System (BRFSS). Soz Praventivmed. 2001;46(Suppl 1):S3–42.
20. United States Department of Transportation, National Highway Traffic Safety Administration. National Emergency Medical Services Workforce Data Definitions. Washington, DC: DOT HS 811 720, February 2013.
21. Dillman DA, Smyth JD, Christian LM. Internet, Mail, and Mixed-Mode Surveys: The Tailored Design Method. Hoboken, NJ: Wiley & Sons, 2009.
22. Hosmer DW, Lemeshow S, Sturdivant RX. Applied Logistic Regression. Third edition. Hoboken, NJ: Wiley, 2013.
23. Suserud BO, Blomquist M, Johansson. Experiences of threats and violence in the Swedish ambulance service. Accid Emerg Nurs. 2002;10:127–35.
24. Grange JT, Corbett SW. Violence against emergency medical services personnel. Prehosp Emerg Care. 2002;6:186–90.
25. Magnavita N. Workplace violence and occupational stress in healthcare workers: a chicken and egg situation – results of a 6-year follow-up study. J Nurs Scholarsh. 2014;46(5):366–76.
26. Morphet J, Griffiths D, Plummer V, Innes K, Fairhall R, Beattie J. At the crossroads of violence and aggression in the emergency department: perspectives of Australian emergency nurses. Australian health review. 2014;38:194–201.
27. Truman, JL, Langton, L. Criminal Victimization, 2014. Washington, DC: U.S. Department of Justice, Office of Justice Programs, Bureau of Justice Statistics. Revised September 29, 2015. Available at: http://www.bjs.gov/content/pub/pdf/cv14.pdf. Accessed on November 6, 2015.
28. Gillespie GL, Gates DM, Miller M, Howard PK. Workplace violence in healthcare settings: risk factors and protective strategies. Rehabil Nurs. 2010;35(5): 177–84.
29. Korsitas S, Boyle M, Coles J. Factors associated with workplace violence in paramedics. Prehosp Disaster Med. 2009; 24(5):417–21.
30. United States Department of Transportation, National Highway Traffic Safety Administration. National Emergency Medical Services Education Standards. Washington, DC: DOT HS 811 077A, 2009.
31. The National Registry of Emergency Medical Technicians. About Emergency Medical Services (EMS). Available at: https://www.nremt.org/nremt/about/ems_learn.asp. Accessed on May 11, 2015.
32. The National Registry of Emergency Medical Technicians. 2012 Annual Report. Available at: https://www.nremt.org/nremt/downloads/2010_Annual_Report.pdf. Accessed on February 13, 2015.
33. Tversky A, Kahneman D. Availability: a heuristic for judging frequency and probability. Cogn Psychol. 1973;5:207–32.
34. Brown NR, Rips LJ, Shevell SK. The subjective dates of natural events in very-long-term memory. Cogn Psychol. 1985;17(2):139–77.