BMJ Open

Workplace violence among prehospital care providers in India: a cross-sectional study

Benjamin Lindquist ,[1] Kathryn Koval,[2] Aditya Mahadevan,[3] Christine Gennosa,[4] William Leggio,[5] Kian Niknam,[1] G V Ramana Rao,[6] Jennifer A Newberry,[1] Matthew Strehlow[1]

To cite: Lindquist B, Koval K, Mahadevan A, *et al*. Workplace violence among prehospital care providers in India: a cross-sectional study. *BMJ Open* 2019;**9**:e033404. doi:10.1136/bmjopen-2019-033404

► Prepublication history for this paper is available online. To view these files, please visit the journal online (http://dx.doi.org/10.1136/bmjopen-2019-033404).

Received 09 August 2019
Revised 31 October 2019
Accepted 07 November 2019

[1]Department of Emergency Medicine, Stanford University, Stanford, California, USA
[2]Department of Emergency Medicine, Medical University of South Carolina, Charleston, South Carolina, USA
[3]University of California, San Diego, La Jolla, California, USA
[4]Meharry Medical College, Nashville, Tennessee, USA
[5]Department of EMS Education, Creighton University, Omaha, Nebraska, USA
[6]Emergency Medicine Learning Center and Research, GVK Emergency Management and Research Institute, Secunderabad, Telangana, India

Correspondence to
Dr Benjamin Lindquist; blindqu1@stanford.edu

ABSTRACT

Objectives The purpose of this study was twofold: (1) establish the prevalence of safety threats and workplace violence (WPV) experienced by emergency medical technicians (EMTs) in a low/middle-income country with a new prehospital care system, India and (2) understand which EMTs are at particularly high risk for these experiences.

Setting EMTs from four Indian states (Gujarat, Karnataka, Tamil Nadu and Telangana) were eligible to participate during the study period from July through November 2017.

Methods Cross-sectional survey study.

Participants 386 practicing EMTs from four Indian states.

Results The overall prevalence of any WPV was 67.9% (95% CI 63.0% to 72.5%). The prevalence of physical assault was 58% (95% CI 52.5% to 63.4%) and verbal assault was 59.8% (95% CI 54.5% to 65%). Of physical assault victims, 21.7% were injured and 30.2% sought medical attention after the incident. Further, 57.3% (n=216) of respondents reported they were 'somewhat worried' and 28.4% (n=107) reported they were 'very worried' about their safety at work.

Conclusion WPV and safety fears were found to be common among EMTs in India. Focused initiatives to counter WPV in countries developing prehospital care systems are necessary to build a healthy and sustainable prehospital healthcare workforce.

Strengths and limitations of this study

- ► This is the first study to establish the prevalence of workplace violence in the largest prehospital organisation in India.
- ► There was a high response rate (~95%) among participants.
- ► Capturing the true prevalence of violence may be difficult given cultural norms on how violence is defined.
- ► Despite the participants originating from multiple states and a variety of demographic backgrounds, any convenience sample is prone to selection bias which may affect generalisability of study results.
- ► Survey responses were subject to recall bias.

BACKGROUND

There is a growing global focus on the development and retention of a healthy and sustainable healthcare workforce in low/middle-income countries (LMICs). Previous studies in the USA, Australia and LMICs report that 60.0%–87.5% of emergency healthcare providers (eg, nurses and physicians) experience some form of workplace violence (WPV) annually.[1–8] WPV includes both physical and verbal assault from different perpetrators, including bystanders, patients, patients' families and colleagues.[9–11] Most providers report verbal assault, though the exact prevalence is still unknown. Prior studies also report a very wide range (15%–65%) of physical assault in the workplace.[1 7] While the exact prevalence of physical assault is unclear, many postulate it is underreported.[9]

The WHO identified global healthcare providers as particularly vulnerable to WPV, which can substantially affect the welfare and retention of this vital workforce.[12] Prior investigations have examined WPV among emergency department and hospital workers in LMICs, but few studies have been conducted on prehospital care providers such as emergency medical technicians (EMTs).[4 13–15] Importantly, violence at the workplace can lead to injuries requiring medical attention and/or leave from work with one study suggesting that 25% of WPV cases lead to injury and 37% require medical care.[4 16 17] EMTs are at high risk for significant physical and psychological strain that can lead to attrition from burnout and job dissatisfaction.[17] Ultimately, attrition can lead to increased organisational costs and operational strain among a burgeoning workforce of emergency medical service (EMS) providers in LMICs.

To date, there have been no WPV investigations among the ~20 000 EMTs employed by the public sector in India. However, violence towards India's physicians has been

recognised as a common threat. As a result, India has enacted special legislation that includes both prison time and fines for offenders, to protect its physicians.[18–20] Protections afforded by this legislation do not extend to EMTs. Therefore, we investigated the prevalence of safety and WPV experiences by EMTs in India who work in an often unregulated, unpredictable and dynamic environment. EMTs also commonly treat patients with varying degrees of psychological impairment and substance abuse who may be prone to violent behaviour.[9 21] This compounds their safety risks and increases the likelihood of verbal or physical violence.

The purpose of this study was twofold: (1) establish the prevalence of safety threats and WPV experienced by EMTs in an LMIC with a new prehospital care system, India and (2) understand which EMTs are at particularly high risk for these experiences. This knowledge will inform future educational and system interventions across the globe to improve EMT safety and strengthen prehospital care workforce development.

MATERIALS AND METHODS

Study design, setting and population

This study employed a cross-sectional survey, which was conducted concurrently with EMT educational sessions in India. EMTs from four Indian states (Gujarat, Karnataka, Tamil Nadu and Telangana) were eligible to participate during the study period from July 2017 through November 2017.

Survey development and data collection

The study survey was adapted from a previous validated instrument that was created by the Joint Programme on Workplace Violence in the Healthcare Sector (ILO/ICN/WHO/PSI) for use in LMIC healthcare settings.[11] The study survey was divided into three main sections. The first section addressed general safety concerns unique to prehospital providers; the second section focused on physical assault; and, the third section focused on verbal assault. The survey and consent were translated and back translated into the four local Indian languages spoken by participants. Participants were given paper copies of the survey at completion of their continuing education sessions at the state EMS headquarters. Written consent was obtained from each participant. Participation in the study was voluntary, without financial compensation and anonymous. Answers were confidential. Survey completion was proctored by research assistants not affiliated with the employer organisation, and participants were notified that their study participation and survey responses would not affect their standing in the organisation.

Outcome measures

The primary outcome for the study was the prevalence of violence experienced in the prior 12 months. Secondary questions of interest included the type of violence experienced (physical or verbal) and characteristics associated with risks to violence. For physical and verbal assault, EMTs were instructed to skip a series of questions if they answered 'no' to experiencing assault in the prior 12 months. However, several EMTs who initially answered no to experiencing assault went on to answer subsequent specific questions regarding assault, suggesting that they actually experienced assault. As a result, these individuals were included in the 'combined' data and overall prevalence of assault.

Patient and public involvement

Patients and the public were not involved in the design, or conduct, or reporting, or dissemination of our research.

Data analysis

The prior reported prevalence of WPV ranges widely from 60% to 87.5%.[7–12 18 22]

We chose a conservative estimate of 60% prevalence to calculate our sample size. Our goal was to estimate the experience within ±5% of the true prevalence. Using the binomial exact function, we estimated our needed sample size to be ~369 EMTs.[23] We used descriptive statistics to examine the distribution of primary and secondary outcomes, and other variables around 95% CIs. The χ^2 test and Fisher's exact test were used for comparing grouped data, as appropriate. Single variate logistic regression was used to examine measures of association between assault subtype, and age, state of employment, length of employment, education and social status. Analyses were run using STATA V.14/SE for Windows.

RESULTS

A total of 386 EMTs completed the survey with a 95% response rate of those approached for survey participation. The demographic data for the entire study population are reported in table 1. The majority of respondents were male (83.9%, n=324) and aged 25–34 years. Overall, 80.2% (n=288) were from Backwards Caste, Scheduled Tribe or Scheduled Caste, which are all recognised by the Government of India as disadvantaged social communities. There was equal representation between EMTs practicing in urban and rural settings.

Prevalence of WPV

The overall prevalence of WPV was 67.9% (95% CI 63.0% to 72.5%). When comparing the combined and non-combined prevalence of physical assault, we found that the prevalence of physical assault ranged from 18.5% (95% CI 14.3 to 23.4) in the non-combined population to 58.0% (95% CI 52.5 to 63.4) in the combined population. Table 2 provides the demographics for all physical assault victims. When examining verbal assault cases, we found that the prevalence of verbal assault ranged from 41.6% (95% CI 36.3 to 47.0) in the non-combined group to 59.8% (95% CI 54.5 to 64.9) in the combined group. Table 3 provides the demographics for all verbal assault victims.

Table 1 Demographics and sample characteristics

Characteristics	N (%) Entire sample
N	386
Age, years	
20–24	62 (16.1)
25–29	134 (34.7)
30–34	157 (40.7)
≥35	25 (6.5)
Missing	8 (2.1)
Gender	
Male	324 (83.9)
Female	51 (13.2)
Missing	11 (2.9)
Workplace state	
Gujarat	86 (22.3)
Karnataka	118 (30.6)
Tamil Nadu	65 (16.8)
Telangana	117 (30.3)
Length of employment	
<1 year	31 (8.0)
1–2 years	48 (12.4)
3–4 years	75 (19.4)
5–7 years	122 (31.6)
≥8 years	108 (28.0)
Missing	2 (0.5)
Highest education	
Below university degree	133 (34.5)
University degree	177 (45.9)
Postgraduate degree	69 (17.9)
Missing	7 (1.8)
Work environment	
Urban	187 (48.4)
Rural	189 (59.0)
Missing	10 (2.6)

Violence characteristics

For analysis of violence characteristics, only study participants who answered 'yes' to assault on the survey were included. Of the EMTs who were physically assaulted, 44.6% (n=25) experienced a single episode of assault over the prior 12 months (as reported in table 4). Twenty-five (44.6%) of physical assault victims suffered at least two or more episodes over the prior 12 months. The majority of the assailants (37.5%, n=21) were related to the patient. Of the 56 victims of physical assault, 17.9% (n=10) were injured and 23.2% (n=13) sought medical attention after the incident. Weapons were used in 7.1% (n=4) of physical assault cases.

Most verbal assault victims (70.6%, n=101) experienced at least two or more of episodes of verbal assault over the prior 12 months (table 4). Similar to physical assault, most of the verbal assaulters (32.9%, n=47) were relatives of the patients.

Safety concerns

Table 5 summarises EMT safety concerns. In total, 56.0% (n=216) of survey respondents reported they were 'somewhat worried' and 27.7% (n=107) reported they were 'very worried' about their overall safety at work. Additionally, 45.6% (n=176) reported they were somewhat worried and 15.5% (n=60) reported they were very worried about physical assault at work. Overall, 34.5% of EMTs reported that they occasionally placed themselves in danger at work, while 4.9% reported that they placed themselves in danger frequently or 'all the time'. Despite these widespread safety concerns, 78.5% of EMTs surveyed reported that they had not received specific training on how to manage violence in the workplace.

Associations

Table 6 reports on associations between EMT characteristics and verbal or physical assault experiences.

For verbal assault, compared with EMTs ≥35 years, EMTs between the ages of 25 and 29 years were significantly more likely to report verbal assault in the previous 12 months (OR 3.11; 95% CI 1.18 to 8.22). Compared with the state of Telangana, EMTs practicing in the state of Karnataka were half as likely to report verbal assault over the previous 12 months (OR 0.5; 95% CI 0.29 to 0.86).

When compared with EMTs working in the state of Telangana, those in Gujarat (OR 8.12; 95% CI 3.71 to 17.79), Karnataka (OR 1.98; 95% CI 1.13 to 3.46) and Tamil Nadu (OR 1.93; 95% CI 1.02 to 3.67) were significantly more likely to report physical assault in the prior 12 months. Those EMTs with a university degree (OR: 0.28; 95% CI 0.16 to 0.48) and postgraduate degree (OR 0.23; 95% CI 0.12 to 0.46) were significantly less likely to report physical assault in the previous 12 months.

DISCUSSION

To our knowledge, this is the first in-depth assessment of workplace safety and violence among practicing EMTs in India, a unique subset of global healthcare providers. As the global community has begun to prioritise safety and retention of all healthcare workers, the United Nations' Sustainable Development Goals (SDGs) have recognised the importance of ensuring a healthy workforce. However, only one of the SDG's subtargets mentions these important healthcare workers.[24 25] As a result, specific plans and interventions to meet this goal are still lacking. While there are many factors that contribute to the effective development and retention of healthcare workers, healthcare provider safety and protection from WPV are essential to creating a sustainable workforce as EMS grows globally.

Table 2 Physical assault victim demographics

Characteristics	N (%) Non-combined physical assault			N (%) Combined physical assault*		
	Yes	No	P value	Yes	No	P value
N	56 (14.5)	246 (63.7)		192 (59.7)	139 (36.0)	
Age, years						
20–24	13 (23.2)	37 (15.0)		34 (17.7)	21 (15.1)	
25–29	29 (51.8)	75 (30.5)		78 (40.6)	38 (27.3)	
30–34	10 (17.9)	111 (45.1)		61 (31.8)	69 (49.6)	
≥35	3 (5.4)	19 (7.7)		14 (7.3)	9 (6.5)	
Missing	1 (1.8)	4 (1.6)	0.006	5 (2.6)	2 (1.4)	0.077
Gender						
Male	49 (87.5)	207 (84.2)		162 (84.4)	116 (83.5)	
Female	6 (10.7)	34 (13.8)		26 (13.5)	20 (14.4)	
Missing	1 (1.8)	5 (2.0)	0.453	4 (2.1)	3 (2.2)	0.322
Workplace state						
Gujarat	18 (32.1)	31 (12.6)		56 (29.2)	10 (7.2)	
Karnataka	20 (35.7)	75 (30.5)		60 (31.3)	44 (31.7)	
Tamil Nadu	7 (12.5)	55 (22.4)		36 (18.8)	27 (19.4)	
Telangana	11 (19.6)	85 (34.6)	<0.001	40 (20.8)	58 (41.7)	<0.001
Length of employment						
<1 year	4 (7.1)	24 (9.8)		19 (9.9)	12 (8.6)	
1–2 years	8 (14.3)	34 (13.8)		22 (11.5)	22 (15.8)	
3–4 years	17 (30.4)	36 (14.6)		41 (21.4)	21 (15.1)	
5–7 years	18 (32.1)	72 (29.3)		63 (32.8)	38 (27.3)	
≥8 years	9 (16.1)	78 (31.7)		46 (24.0)	45 (32.4)	
Missing	0 (0.0)	2 (0.8)	0.022	1 (0.5)	1 (0.7)	0.156
Highest education						
Below university degree	29 (51.8)	61 (24.8)		85 (44.3)	24 (17.3)	
University degree	16 (28.6)	132 (53.7)		77 (40.1)	79 (56.8)	
Postgraduate degree	10 (17.9)	49 (19.9)		27 (14.1)	33 (23.7)	
Missing	1 (1.8)	4 (1.6)	<0.001	3 (1.6)	3 (2.2)	<0.001
Work environment						
Urban	23 (41.1)	129 (52.4)		85 (44.3)	79 (56.8)	
Rural	31 (55.4)	112 (45.5)		101 (52.6)	58 (41.7)	
Missing	2 (3.6)	5 (2.0)	0.244	6 (3.1)	2 (1.4)	0.124

*Combined physical assault includes EMTs who answered 'no' to an initial question about assault but answered subsequent, more specific questions about details of assault experiences.
EMTs, emergency medical technicians.

Our study revealed that a significant percentage of EMTs that we surveyed (67.9%) had experienced some form of WPV in the prior 12 months. Furthermore, 58% of surveyed EMTs (95% CI 52.5% to 63.4%) had been physically assaulted, which is significantly higher than reported in most prior studies of global healthcare workers (18%–38%).[1 7 13 26] Specifically, Indian EMTs were more likely to experience physical assault than emergency department workers in Karachi, Pakistan (16.5%) and Johannesburg, South Africa (17%).[1 13 27] While a recent multicenter study of EMTs in Iran revealed rates of physical assault (60.3%) comparable to our Indian study population (58%),[14] physical violence among EMTs was less frequent in Saudi Arabia (8.3%), Chile (13.5%) and a prior study from Iran (38%).[14 15 27 28] More than half of our participants also experienced verbal assault (59.8%; 95% CI 54.5% to 65%). Yet, Indian EMTs were less likely to experience verbal assault than emergency department workers in Karachi, Pakistan (72.5%), Australia (67%) and EMTs

Table 3 Verbal assault victim demographics

Characteristics	N (%) Non-combined victims of verbal assault			N (%) Combined verbal assault		
	Yes	No	P value	Yes	No	P value
N	143 (37.0)	201 (52.1)		211 (54.7)	142 (36.8)	
Age, years						
20–24	22 (15.4)	33 (16.4)		32 (15.2)	23 (16.2)	
25–29	64 (44.8)	58 (28.9)		83 (39.3)	40 (28.2)	
30–34	55 (38.5)	90 (44.8)		82 (38.9)	66 (46.5)	
≥35	1 (0.7)	16 (8.0)		8 (3.8)	12 (8.5)	
Missing	1 (0.7)	4 (2.0)	<0.001	6 (2.8)	1 (0.7)	0.033
Gender						
Male	116 (81.1)	173 (86.1)		175 (82.9)	120 (84.5)	
Female	25 (17.5)	22 (10.9)		31 (14.7)	18 (12.7)	
Missing	2 (1.4)	6 (3.0)	0.126	5 (2.4)	4 (2.8)	0.475
Workplace state						
Gujarat	31 (21.7)	36 (17.9)		44 (20.9)	24 (16.9)	
Karnataka	28 (19.6)	80 (39.8)		54 (25.6)	57 (40.1)	
Tamil Nadu	32 (22.4)	31 (15.4)		41 (19.4)	23 (16.2)	
Telangana	52 (36.4)	54 (26.9)	<0.001	72 (34.1)	38 (26.8)	<0.001
Length of employment						
<1 year	15 (10.5)	16 (8.0)		19 (9.0)	12 (8.5)	
1–2 years	14 (9.8)	32 (15.9)		25 (11.9)	22 (15.5)	
3–4 years	31 (21.7)	34 (16.9)		45 (21.3)	22 (15.5)	
5–7 years	48 (33.6)	56 (27.9)		69 (32.7)	38 (26.8)	
≥8 years	34 (23.8)	62 (30.8)		51 (24.2)	48 (33.8)	
Missing	1 (0.7)	1 (0.5)	0.125	2 (1.0)	0 (0.0)	0.101
Highest education						
Below university degree	42 (29.4)	68 (33.8)		65 (30.8)	46 (32.4)	
University degree	67 (46.9)	99 (49.3)		100 (47.4)	72 (50.7)	
Postgraduate degree	31 (21.7)	32 (15.9)		42 (19.9)	22 (15.5)	
Missing	3 (2.1)	2 (1.0)	0.021	4 (1.9)	2 (1.4)	0.003
Work environment						
Urban	77 (53.8)	96 (47.8)		106 (50.2)	70 (49.3)	
Rural	63 (44.1)	102 (50.7)		99 (46.9)	71 (50.0)	
Missing	3 (2.1)	3 (1.5)	0.022	6 (2.8)	1 (0.7)	0.055

in Iran (78.1%) and Saudi Arabia (61%), while more likely than EMTs in Chile (46.6%).[1 14 15]

Secondarily, our investigation sought to identify predictors for verbal and physical assault. Our results revealed few significant associations between predictor variables and experiences of WPV. For physical assault, EMTs in Gujarat, Karnataka and Tamil Nadu were significantly more likely to experience WPV. Indian EMTs with higher education were more likely to experience verbal assault but were significantly less likely to experience physical assault. Our study does not suggest that EMTs of any particular class are being targeted.

Additionally, our study revealed that EMTs in India are also concerned about their safety in the workplace with 83.7% of EMTs reporting they were somewhat or very worried about safety at work. However, in India and across much of the world, there is a paucity of specialised training on how to manage WPV and safety threats. In fact, 78.5% of respondents in our study reported they had not received any training on how to deal with such incidents.

To meet this training gap, there is a growing body of literature.[26 29–31] One study identified six themes to consider both prior to and during an event: (1) knowledge of

Table 4 Characteristics of violence

Characteristics	N (%) Physical assault	N (%) Verbal assault
N	56	143
How often		
Once	25 (44.6)	40 (28.0)
2–3 times	13 (23.2)	65 (45.4
4–6 times	8 (14.3)	19 (13.3)
≥7 times	4 (7.1)	17 (11.9)
Missing	6 (23.2)	2 (1.4)
Weapons involved		
Yes	4 (7.1)	n/a
No	41 (73.2)	n/a
Missing	11 (19.6)	n/a
Was assault reported?		
Yes	23 (41.1)	73 (51.0)
No	31 (55.4)	58 (40.6)
Missing	2 (3.6)	12 (8.4)
Why was assault not reported?		
Afraid	12 (21.4)	27 (18.9)
Ashamed	2 (3.6)	4 (2.8)
It was not important	5 (8.9)	18 (12.6)
Felt guilty	2 (3.6)	4 (2.8)
Afraid of consequences	13 (23.2)	25 (17.5)
Nothing would happen	13 (23.2)	30 (21.0)
Missing	9 (16.1)	35 24.5)
Who was the attacker?		
Patient	3 (5.4)	17 (11.9)
Relative	21 (37.5)	47 (32.9)
Bystander	14 (25)	30 (21.0)
Coworker	3 (5.4)	13 (9.1)
Hospital worker	7 (12.5)	26 (18.2)
Mob of people	8 (14.3)	25 (17.5)
Police officer	1 (1.8)	9 (6.3)
Other	5 (8.9)	16 (11.2)
Missing	7 (12.5)	10 (7.0)
Gender of attacker		
Male	44 (78.6)	109 (76.2)
Female	2 (3.6)	9 (6.3)
Both	0 (0)	11 (7.7)
Missing	10 (17.9)	14 (9.8)
Physical injury		
Yes	10 (17.9)	n/a
No	36 (64.3)	n/a
Missing	10 (17.9)	n/a
Type of injury		
Laceration	9 (16.1)	n/a
Head injury	4 (7.1)	n/a
Broken bone	2 (3.6)	n/a
Bruising	9 (16.1)	n/a
Missing	35 (62.5)	n/a
Did you seek medical attention?		
Yes	13 (23.2)	n/a
No	30 (53.6)	n/a
Missing	13 (23.2)	n/a

special populations; (2) ability to restrain or defend; (3) systems for advanced warning about potentially violent patients; (4) improved public awareness; (5) improved situational awareness among EMTs; and, (6) improved scene support from law enforcement.[29]

Table 5 Safety concerns

Survey question	N (%)
Worried about safety?	
Not at all	54 (14.0)
Somewhat	216 (56.0)
Very worried	107 (27.7)
Missing	9 (2.3)
How often have you placed yourself in danger?	
Never	134 (34.7)
Rarely	73 (18.9)
Occasionally	133 (34.5)
Frequently	19 (4.9)
All the time	7 (1.8)
Missing	20 (5.2)
Have you been encouraged to place yourself in danger?	
Yes	111 (28.8)
No	251 (65.0)
Missing	24 (6.2)
Are you worried about physical assault?	
Not at all	122 (31.6)
Somewhat	176 (45.6)
Very worried	60 (15.5)
Missing	28 (7.3)
Were you encouraged to report physical assault?	
Yes	105 (27.2)
No	236 (61.1)
Missing	45 (11.7)
Have you received training on physical assault?	
Yes	31 (8.0)
No	303 (78.5)
Missing	52 (13.5)

Table 6 Associations

Characteristics	Combined PA in previous 12 months OR (95% CI)	Combined VA in previous 12 months OR (95% CI)
Age, years		
Reference: age ≥35		
20–24	1.04 (0.38 to 2.83)	2.09 (0.74 to 5.92)
25–29	1.32 (0.52 to 3.32)	3.11 (1.18 to 8.22)*
30–34	0.57 (0.23 to 1.41)	1.86 (0.72 to 4.83)
State		
Reference: Telangana		
Gujarat	8.12 (3.71 to 17.79)*	0.97 (0.51 to 1.82)
Karnataka	1.98 (1.13 to 3.46)*	0.5 (0.29 to 0.86)*
Tamil Nadu	1.93 (1.02 to 3.67)*	0.94 (0.49 to 1.79)
Length of employment		
Reference: <1 year		
1–2 years	0.63 (0.25 to 1.61)	0.72 (0.28 to 1.80)
3–4 years	1.23 (0.50 to 3.01)	1.29 (0.53 to 3.12)
5–7 years	1.05 (0.46 to 2.39)	1.15 (0.50 to 2.61)
>/=8 years	0.65 (0.28 to 1.48)	0.67 (0.29 to 1.53)
Education		
Reference: below university		
University degree	0.28 (0.16 to 0.48)*	0.98 (0.61 to 1.60)
Postgraduate degree	0.23 (0.12 to 0.46)*	1.35 (0.71 to 2.56)

*Significant at p=0.05 .
PA, physical assault; VA, verbal assault.

Our results echo the limited research to date, suggesting that a much broader effort is required to address workplace safety and violence among EMTs. Pathways for improved recognition and reporting of WPV are required. Specialised training programme for EMTs on dealing with WPV would be extremely beneficial. Finally, EMTs should be covered by regulations and/or policies to protect healthcare workers.

Limitations

In reviewing our survey results, there were several EMTs who initially answered no when queried about experiencing assault but subsequently answered questions that suggested they may have actually experienced assault. Because of this observation, the prevalence was calculated for those who answered no to violence, but a separate prevalence was calculated for those EMTs who answered no to violence but yes to specific questions about assault experiences. It was decided to include these individuals in the overall prevalence since their initial responses may have suggested a limited understanding of what constitutes WPV. WPV definitions according to the survey may be considered as part of a normal patient, or patient family reaction, rather than violence. In evaluating characteristics of violence, only EMTs who answered yes to experiencing violence on the initial survey questions were included because there was missing data from surveys completed by individuals who initially answered no to violence but subsequently answered one or more, but not all, specific questions about experiences with violence. Therefore, the denominator for any given violence characteristic was more reliable in individuals who answered yes to violence and then completed the rest of the questions about those experiences.

Many EMTs did not report assault experiences at the time of the actual event (55.4% of physical assault victims and 40.6% of verbal assault victims did not report). As reflected in prior studies of WPV,[4] it is quite possible that many of the EMTs we surveyed may have continued to choose not to report their experiences with WPV, and that our observed prevalence of WPV may be underestimated. Encouraging EMTs to report on their experiences with WPV, and developing reporting protocols, is a key first step in ensuring the safety of prehospital care providers.

Since this is the first WPV study conducted among prehospital providers in India, we chose to adapt a survey instrument that was previously used on physicians and nurses in LMICs. This survey may not have the same validity when applied to our study population. Further, there was potential for selection bias, as study participants were selected based on the dates of enrolment for a required educational event. However, since attendance at these educational programme was mandatory for all practicing EMTs and the vast majority enrolled in our study, our research findings should be generalisable at least within India.

CONCLUSION

EMTs in India are experiencing WPV, both in physical and verbal assault, and threats to safety at high rates. These experiences often go unrecognised by EMTs and are likely underreported as a result. However, outside of location, our study revealed no significant individual EMT characteristics that predicted higher rates WPV. In addressing WPV in India and other global EMS agencies, future initiatives should focus on improving EMT recognition of violence, strengthening reporting pathways, identifying preventive measures and developing educational sessions for responding to violence when it occurs.

Twitter Jennifer A Newberry @mtyk079

Contributors BL, KK, JAN and MS designed this study. BL, KK, AM, WL and GVRR drafted the manuscript. BL, KK, AM, CG and JAN collected data and controlled quality. KN conducted the data analyses. All authors contributed to writing and publishing the final manuscript.

Funding The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests None declared.

Patient consent for publication Not required.

Ethics approval Stanford University Institutional Review Board-41774 GVK EMRI Institutional Review Board.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Data are available upon reasonable request.

ORCID iD

Benjamin Lindquist http://orcid.org/0000-0001-8278-3077

REFERENCES

1 Zafar W, Siddiqui E, Ejaz K, *et al*. Health care personnel and workplace violence in the emergency departments of a volatile Metropolis: results from Karachi, Pakistan. *J Emerg Med* 2013;45:761–72.
2 Behnam M, Tillotson RD, Davis SM, *et al*. Violence in the emergency department: a national survey of emergency medicine residents and attending physicians. *J Emerg Med* 2011;40:565–79.
3 Kowalenko T, Gates D, Gillespie GL, *et al*. Prospective study of violence against ED workers. *Am J Emerg Med* 2013;31:197–205.
4 Pourshaikhian M, Abolghasem Gorji H, Aryankhesal A, *et al*. A systematic literature review: workplace violence against emergency medical services personnel. *Arch Trauma Res* 2016;5:e28734.
5 Schnapp BH, Slovis BH, Shah AD, *et al*. Workplace violence and harassment against emergency medicine residents. *West J Emerg Med* 2016;17:567–73.
6 Suserud BO, Blomquist M, Johansson I. Experiences of threats and violence in the Swedish ambulance service. *Accid Emerg Nurs* 2002;10:127–35.
7 Boyle M, Koritsas S, Coles J, *et al*. A pilot study of workplace violence towards paramedics. *Emerg Med J* 2007;24:760–3.
8 Muzembo BA, Mbutshu LH, Ngatu NR, *et al*. Workplace violence towards Congolese health care workers: a survey of 436 healthcare facilities in Katanga Province, Democratic Republic of Congo. *J Occup Health* 2015;57:69–80.
9 Phillips JP. Workplace violence against health care workers in the United States. *N Engl J Med* 2016;374:1661–9.
10 Martino V. *Relationship between work stress and workplace violence in the health sector. Workplace violence in the health sector*. International Labour Office, International Council of Nurses, World Health Organization, 2003.
11 ILO, ICN, WHO, PSI. *International labour office ILO international Council of nurses ICN World Health organization who public services international*, 2002.
12 World Health Organization. *Global health workforce alliance. Global strategy on human resources for health*. World Health Organization, 2014.
13 Rahmani A, Hassankhani H, Mills J, *et al*. Exposure of Iranian emergency medical technicians to workplace violence: a cross-sectional analysis. *Emerg Med Australas* 2012;24:105–10.
14 Hosseinikia SH, Zarei S, Najafi Kalyani M, *et al*. A cross-sectional multicenter study of workplace violence against prehospital emergency medical technicians. *Emerg Med Int* 2018;2018:7835676
15 Campo VR, Klijn TP. Verbal abuse and mobbing in pre-hospital care services in Chile. *Rev Lat Am Enfermagem* 2018;25:e2956.
16 Reichard AA, Marsh SM, Moore PH. Fatal and nonfatal injuries among emergency medical technicians and paramedics. *Prehosp Emerg Care* 2011;15:511–7.
17 Deniz T, Saygun M, Eroğlu O, *et al*. Effect of exposure to violence on the development of burnoutsyndrome in ambulance staff. *Turk J Med Sci* 2016;46:296–302.
18 Kumar M, Verma M, Das T, *et al*. A study of workplace violence experienced by doctors and associated risk factors in a tertiary care hospital of South Delhi, India. *J Clin Diagn Res* 2016;10:LC06–10.
19 Pulla P. Two Indian states promise to enforce act that punishes violent attacks against doctors. *BMJ* 2015;350:h2725.
20 Ambesh P. Violence against doctors in the Indian subcontinent: a rising bane. *Indian Heart J* 2016;68:749–50.
21 Administration OSHA. Guidelines for preventing workplace violence for healthcare and social service workers, 2015. Available: https://www.osha.gov/Publications/osha3148.pdf [Accessed 11 Nov 2018].
22 Taylor JA, Davis AL, Barnes B, *et al*. Injury risks of EMS responders: evidence from the National fire fighter near-miss reporting system. *BMJ Open* 2015;5:e007562.
23 Hulley SB, Cummings SR, Browner WS, *et al*. *Designing clinical research : an epidemiologic approach*. 4th ed. Philadelphia, PA: Lippincott Williams & Wilkins, 2013: 81.
24 Unived Nations. Sustainable development goal 3. sustainable development goals. Available: https://sustainabledevelopment.un.org/sdg3 [Accessed 10 Nov 2018].
25 de Francisco Shapovalova N, Meguid T, Campbell J. Health-care workers as agents of sustainable development. *Lancet Glob Health* 2015;3:e249–50.
26 Bigham BL, Jensen JL, Tavares W, *et al*. Paramedic self-reported exposure to violence in the emergency medical services (EMS) workplace: a mixed-methods cross-sectional survey. *Prehosp Emerg Care* 2014;18:489–94.
27 Martino DV. *Workplace violence in the health sector - country case studies: Brazil, Bulgarian, Lebanon, Portugal, South Africa, Thailand, plus an additional Australian study: synthesis report*. Geneva: WHO, 2003.
28 Alharthy N, Mutairi MA, Alsahli A, *et al*. Workplace violence among emergency medical services workers in Riyadh, Saudi Arabia. *J Hosp Adm* 2017;6:26–32.
29 Maguire BJ, O'Neill BJ, O'Meara P, *et al*. Preventing EMS workplace violence: a mixed-methods analysis of insights from assaulted medics. *Injury* 2018;49:1258–65.
30 Collopy KT, Kivlehan SM, Snyder SR. Recognizing and defusing aggressive patients. EMS world. Available: https://www.emsworld.com/ article/10427168/recognizing-and-defusing-aggressive-patients [Accessed 3 May 2019].
31 Erich J. How to manage your risk. EMS world. Available: http://www.emsworld.com/article/10845691/death-and-injury-risks-to-ems [Accessed 3 May 2019].