Clinical Characteristics and Prehospital Care Patterns in 911-Responses for Motor Vehicle Collisions with and without Patient Extrication

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BACKGROUND

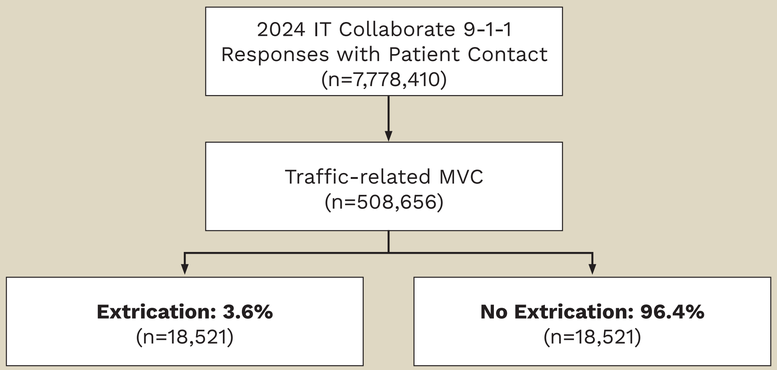
Motor vehicle collisions (MVC) remain a leading cause of injury and death in the United States. Entrapped patients are at a higher risk of significant injury than patients who are not. Recent studies have outlined clinical recommendations for treatment of entrapped patients including airway management and patient experience as well as safety implications for first responders on scene and best practices for performing the extrication itself. There remains a need for studies to compare the characteristics and prehospital care patterns of 9-1-1 responses for MVCs between those with and without patient extrication at the national level.

OBJECTIVE

The primary goal of this study was to compare characteristics of patients and prehospital care in MVC with and without documented extrication.

METHODS

Study Inclusion Criteria:



- Pedestrian, pedal cyclist, and non-traffic MVC excluded to minimize potential differences in extrication methods required.
- Extrication was identified based on documentation in either NEMSIS eInjury.04 (Trauma Triage Criteria) or eResponse.10 (Type of Scene Delay).

Study Statistics:

- Descriptive statistics (n, %) and chi-square test were used to assess differences in patient demographics, clinical status, and prehospital care provided by extrication status.
- Distribution of key response times (time to first vital sign measurement, first airway procedure, and total time on scene) by extrication status were compared (median, interquartile range).
- Stata 19 MP was used for all analyses.

Table 1. Patient and Responses Characteristics in MVC with and without Extrication

Clinical Characteristic	No Extrication N= (column %) N=490,135	Extrication N= (column %) N=18,521	p-value
Age (Years)			
<1	2,162 (0.4%)	61 (0.3%)	<0.001
1-3	5,197 (1.1%)	150 (0.8%)	
4-7	8,575 (1.7%)	223 (1.2%)	
8-12	11,852 (2.4%)	347 (1.9%)	
13-15	9,708 (2.0%)	340 (1.8%)	
16-24	89,828 (18.3%)	3,811 (20.6%)	
25-34	81,354 (16.6%)	3,441 (18.6%)	
35-44	65,286 (13.3%)	2,727 (14.7%)	
45-54	51,653 (10.5%)	2,049 (11.1%)	
55-64	47,181 (9.6%)	1,897 (10.2%)	
65+	56,358 (11.5%)	2,543 (13.7%)	
Missing	60,981 (12.4%)	932 (5.0%)	
Gender			
Female	213,981 (43.7%)	7,467 (40.3%)	<0.001
Male	212,819 (43.4%)	10,124 (54.7%)	
Missing	63,335 (12.9%)	930 (5.0%)	
Initial Acuity			
Critical	17,022 (3.5%)	4,155 (22.4%)	<0.001
Emergent	68,659 (14.0%)	6,636 (35.8%)	
Lower Acuity	253,240 (51.7%)	4,046 (21.8%)	
Dead	1,637 (0.3%)	437 (2.4%)	
Missing	149,577 (30.5%)	3,247 (17.5%)	
Anatomic Location of Chief Complaint			
Trunk	51,195 (10.4%)	2,216 (11.9%)	<0.001
Extremity-Lower	30,917 (6.3%)	1,774 (9.6%)	
Extremity-Upper	32,614 (6.7%)	1,053 (5.7%)	
General/Global	107,963 (22.0%)	6,255 (33.8%)	
Pelvis/Genitalia	752 (0.2%)	37 (0.2%)	
Head	38,100 (7.8%)	1,824 (9.8%)	
Neck	20,345 (4.2%)	455 (2.5%)	
Missing	208,249 (42.5%)	4,907 (26.5%)	
Mechanism of Injury			
Penetrating	1,953 (0.4%)	142 (0.8%)	<0.001
Blunt	254,859 (52.0%)	13,893 (75.0%)	
Burn	756 (0.2%)	38 (0.2%)	
Multiple	38,666 (7.9%)	2,511 (13.6%)	
Missing	193,901 (39.6%)	1,937 (10.5%)	
Time of Day			
0:00-5:59	40,0606 (8.2%)	2,487 (13.4%)	<0.001
6:00-11:59	118,321 (24.1%)	4,254 (23.0%)	
12:00-17:59	205,658 (42.0%)	6,631 (35.8%)	
18:00-23:59	126,096 (25.7%)	5,149 (27.8%)	
Transport Disposition			
Transported	251,071 (51.2%)	15,653 (84.5%)	<0.001
Non-Transport	129,898 (26.5%)	2,137 (11.5%)	
Refusal/Against Medical Advice	109,166 (22.3%)	731 (3.9%)	
Urbanicity			
Metro Area	355,277 (72.5%)	11,646 (62.9%)	<0.001
Non-metro Area/Rural	70,369 (14.4%)	5,805 (31.3%)	
Missing	64,489 (13.2%)	1,070 (5.7%)	

Figure 1. Medications Administered by EMS by Extrication Status

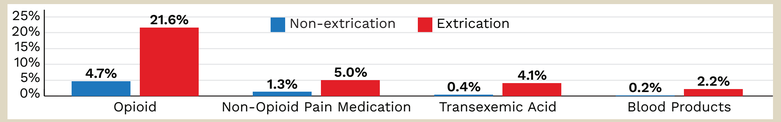


Figure 2. Procedures Used by EMS by Extrication Status

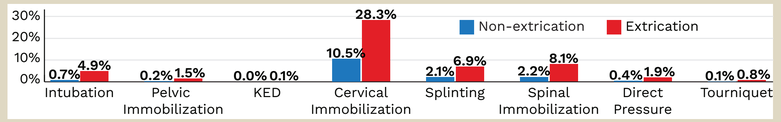
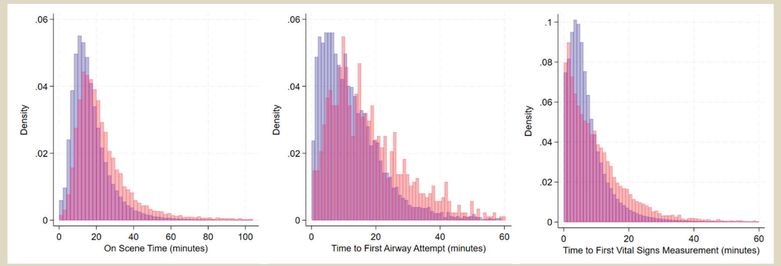


Figure 3. Distribution of Key Response Times from EMS Arrival in MVC by Extrication Status



Difference in median time interval between MVCs with & without extrication:

- Time to first measured vital sign: 2.1 minutes longer
- Time to first airway: 4.7 minutes longer
- Overall time on scene: 5 minutes longer

CONCLUSIONS

Patients in MVC that required extrication were in worse clinical condition and required higher levels of prehospital clinical intervention than those in MVC without extrication. Furthermore, time to initiate key assessment and resuscitation procedures took longer, as well as total time on scene. It is possible that some clinicians may document extrication exclusively in the narrative, which would limit their capture in this study due to the lack of narrative availability in the dataset. This may contribute to the lower prevalence of MVC extrications in this study compared to other estimates. Overall, while less than 5% of MVC in this national cross-section of 9-1-1-responses had extrication documented, patterns of care, additional scene time and increased transport for these patients indicate a subset with high prehospital resource utilization.