

IMPACT OF HELMET LAW REPEAL ON MOTORCYCLE CRASH INCIDENTS ATTENDED BY EMS IN MISSOURI

BACKGROUNDS

Previous research has shown motorcycle helmets save lives, reduce serious injuries, and reduce costs associated with healthcare, lost productivity, and other economic costs.¹⁻³ The state of Missouri repealed its universal helmet use law for motorcyclists aged 26 and older with valid health insurance on August 28, 2020. The aim of this study was to compare characteristics of motorcycle crashes (MCC) attended by emergency medical services (EMS) in Missouri before and after the repeal of the helmet use law.

METHODS

Inclusion criteria for this study were 9-1-1 EMS responses involving a MCC injury where the patient was either a driver or passenger on a motorcycle and was at least 26 years of age. MCC injuries were identified using injury cause ICD-10 Codes V2O-V29. Occupant safety equipment use, provider impressions, chief complaint anatomical location, and patient care narratives were used to categorize helmet use and head injuries. Incidents were ascertained for two time periods: March 1, 2020 through August 27, 2020 (before helmet law repeal) and March 1, 2021 through August 27, 2021 (after helmet law repeal). Patient demographics, urbanicity, helmet use, head injury, patient acuity, Glasgow Coma Score (GCS) and trauma team activations were examined. Categorical variables were compared for the two time periods with chi-square tests to assess differences in proportions.

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RESULTS

- 682† MCC (7% of all motor vehicle incidents) before the helmet law repeal.
- 1,031 MCCs (8% of all motor vehicle incidents) that occurred after the helmet law repeal.
- The age, sex, and race distributions of MCC patients did not differ by time period.
- After the repeal, there was a 53% decrease in the proportion of MCC patients that were helmeted (77.3% vs 36.2%, p<0.01).
- Prevalence of documented head injuries, patients with critical injuries, patients with GCS <8, and trauma team activations increased by 50%, 64%, 64%, and 20%, respectively (all p<0.001) after the law was repealed.
- There was no significant difference in the proportion of MCC incidents that resulted in patient deaths reported by EMS before and after the law repeal (2.5%vs 2.2%, p=0.363), but not all roadway deaths were documented by EMS.
- There was a 53% increase in missing documentation of helmet use by the provider after the helmet law repeal, indicating a change in helmet documentation by providers.

† Of note, the number of incidents increased in 2021 was most likely due to the COVID-19 shelter in place order that had led to less travel, being lifted from the prior year.

Table 1. Motorcycle incidents Attended Variables	Prior to	Total	
variables		After Helmet Law Repeal ^a	Iotai
	Helmet Law		
	Repeal ^a (2020)	(2021)	70.750
N All Injury Incidents	35,048	44,711	79,759
N All Transport Incidents	9,236	12,701*	21,937
N Motorcycle Incidents	682	1,031*	1,713
Patient Age			
26-35 years	204 (29.9%)	303 (29.4%)	507 (29.6%)
36-45 years	160 (23.5%)	244 (23.7%)	404 (23.6%)
46-55 years	133 (19.5%)	235 (22.8%)	368 (21.5%)
>55 years	185 (27.1%)	249 (24.2%)	434 (25.3%)
Patient Sex			× 7
Male	577 (84.6%)	897 (87.0%)	1,474 (86.1%)
Female	103 (15.1%)	133 (12.9%)	236 (13.8%)
Unknown	2 (0.3%)	1 (0.1%)	3 (0.1%)
Race	2 (0.570)	1 (0.170)	5 (0.170)
	550 (00 00/)	912 (TO 99/)	1 202 (00 70/)
White Plast or A frican American	558 (82.0%)	823 (79.8%)	1,382 (80.7%)
Black or African American	82 (12.0%)	101 (9.8%)	183 (10.7%)
Hispanic Other an Multiple Bears	6 (0.9%)	14 (1.4%)	20 (1.2%)
Other or Multiple Races	5 (0.7%)	7 (0.7%)	12 (0.7%)
Unknown	30 (4.4%)	86 (8.3%)*	116 (6.8%)
Urbanicity ^b			
Metro	476 (69.8%)	674 (65.4%)*	1,150 (67.1%)
Non-Metro	102 (15.0%)	179 (17.4%)	281 (16.4%)
Rural	26 (3.8%)	31 (3.0%)	57 (3.3%)
Unknown	78 (11.4%)	147 (14.1%)	225 (13.1%)
Helmet Worn			
Yes	527 (77.3%)	518 (36.2%)*	1,045 (61.0%)
No	94 (13.8%)	373 (50.2%)*	467 (27.3%)
Unknown	61 (8.9%)	140 (13.6%)*	201 (11.8%)
Documented Head Injury	01 (0.570)	110 (15:070)	201 (11.0.0)
No	576 (84.5%)	791 (76.7%)*	1,367 (79.8%)
Yes	106 (15.5%)	240 (23.3%)*	346 (20.2%)
Patient Disposition	100 (15.570)	240 (23.370)	540 (20.270)
-	407 (72 00/)	703 (76 00/)*	1 200 (75 20/)
Treated and Transported	497 (72.9%)	792 (76.8%)*	1,289 (75.3%)
Refused Evaluation, Care, or	122 (17.9%)	139 (13.5%)*	261 (15.2%)
Transport			
No Treatment Required	19 (2.8%)	17 (1.7%)	36 (2.1%)
Transferred	19 (2.8%)	46 (4.5%)*	65 (3.8%)
Dead	17 (2.5%)	23 (2.2%)	40 (2.3%)
Treated and Released (Per	8 (1.2%)	15 (1.5%)	23 (1.3%)
protocol)	-	-	-
Patient Acuity ^c			
Critical	46 (6.7%)	113(11.0%)*	159 (9.3%)
Emergent	138 (20.2%)	240 (22.5%)	394 (21.6%)
Lower Acuity	154 (22.6%)	232 (23.3%)	370 (23.0%)
Dead	17 (2.5%)	23 (2.2%)	40 (2.3%)
Patient refused evaluation and care	75 (11.0%)	89 (8.6%)*	164 (9.6%)
Unknown	252 (37.0%)	333 (32.3%)*	585 (34.2%)
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Total Glasgow Coma Scored	200 /07 70/3	051 /00 50/0	1 440 704 7075
Mild (13-15)	598 (87.7%)	851 (82.5%)	1,449 (84.6%)
Moderate (9-12)	17 (2.5%)	22 (2.1%)	39 (2.3%)
Severe (3-8)	40 (5.9%)	100 (9.7%)*	140 (8.2%)
Unknown	27 (4.0%)	58 (5.6%)	85 (5.0%)
Trauma Team Activated			
Yes	135 (19.8%)	245 (23.8%)*	380 (22.2%)
No	528 (77.4%)	743 (72.31%)*	1,271 (74.2%)
Unknown	19 (2.8%)	43 (4.2%)	62 (3.6%)

^aMissouri repelled a Helmet Use Requirement Law that went into effect on August 28th, 2020. The use of a helmet was not required pending the individual was 26 years or older and had valid insurance. This analysis compared data before and after the repeal during the Spring/Summer (Mar 1st-Aug 27th) timeframes

³Metro area includes counties located within a metropolitan area that has over 250,000 residents. Non-Metro area includes urban counties with at least 2,500 residents, that may or may not be adjacent to a metropolitan area. Rural denotes counties that are completely rural or urban with less than 2,500 people in an urban area.

^cFinal Patient acuity was used as primary source, if this was missing, the initial patient acuity was used

^dFinal Patient Total Glasgow Coma score was used as primary source, if this was missing, the initial patient Total Glasgow Coma score was used

*Chi-square p-value <0.05



CONCLUSION

Based on these results, the repeal of the mandatory helmet law in Missouri has been associated with an increase in head injuries, injury severity, and subsequent trauma team activations among MCC patients attended to by EMS. Longer term monitoring is necessary to track the impacts of helmet use in MCCs on EMS resources and costs. There was also a decrease in helmet use documentation by EMS providers after the helmet law was repealed, which may be an indicator in the perception that helmet use documentation is no longer relevant; This has not been well studied, but additional research should be performed to see if these results are similar in other states where helmet use laws are changed. Additionally, training for providers on the importance of documenting safety equipment used by patients may also be necessary, especially when laws change related to incidents seen by EMS.



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