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Repeal of the Michigan helmet law: early clinical impacts

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Abstract

BACKGROUND: Michigan repealed a 35-year mandatory helmet law on April 13, 2012. We examined the early clinical impacts at a level 1 trauma center in West Michigan.

METHODS: Retrospective cohort study comparing outcomes among motorcycle crash victims in a 7-month period before and after the helmet law repeal.

RESULTS: One hundred ninety-two patients were included. After the repeal, nonhelmeted motorcyclists rose from 7% to 29% ($P < .01$). There was no difference in mortality rate after admission; however, crash scene fatalities increased significantly. Intensive care unit length of stay, mechanical ventilation time, and cost of stay were also higher in the nonhelmeted cohort ($P < .05$).

CONCLUSIONS: Our study highlights the negative ramifications of repealing a mandatory helmet law. Motorcyclists not wearing helmets increased significantly in a short period of time. Nonhelmeted motorcyclists more frequently died on the scene, spent more time in the intensive care unit, required longer ventilator support, and had higher medical costs.

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Motorcycle helmet laws have been a controversial issue for several decades. The National Highway Safety Act, implemented in 1966, required that states mandate helmet use to receive federal highway safety and construction funds. This requirement was rescinded in 1976, when Congress revoked the authority of the US Department of Transportation to withhold state funds for helmet law noncompliance.¹ A dramatic increase ranging from 25% to 46% in motorcycle deaths nationwide was observed in the year after this legislative change.² Despite this negative impact, many states weakened or rescinded their motorcycle helmet laws. Today, only 19 states and the District

of Columbia maintain a universal helmet law. Secondary helmet laws, requiring only certain riders (usually those younger than 18 or 21 years) to wear a helmet, are present in 28 states. Illinois, Iowa, and New Hampshire are the only states without a helmet law.^{1,3}

The repeal of mandatory helmet laws continues today despite an established body of evidence demonstrating the clear safety benefit of motorcycle helmets. Multiple studies have shown that nonhelmeted motorcyclists (NHMs) have a higher mortality rate than helmeted motorcyclists (HMs).^{1,2,4} Others have found a higher incidence of lethal and nonlethal head injuries in NHMs.⁵ Furthermore, the financial impact of the injured NHM has been consistently higher than HMs.^{4,6}

Despite strong advocacy efforts from the health care community and traffic safety experts, Michigan repealed a 35-year universal helmet law in April 2012. This study examines the early clinical and financial impacts of the repeal of the mandatory helmet law at a level 1 trauma center in West Michigan.

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Table 1 Demographic and clinical data, 2011 versus 2012

	2011	2012	<i>P</i> value
Male (%)	68/79 (86%)	97/113 (86%)	.96
Age (y)	41.7 ± 15.0	43.7 ± 15.1	.31
Unhelmeted riders	6/79 (7%)	33/113 (29%)	.001
Mortality	2/79 (3%)	4/113 (4%)	.16
Unhelmeted crash scene fatalities*	1/7 (14%)	10/13 (77%)	.007

*Fatalities occurring in Michigan regional health care coalition region 6.

Methods

Study design

Spectrum Health Butterworth Hospital is a 815-bed, level 1 trauma, and tertiary care center serving 13 counties in West Michigan. After obtaining institutional review board approval, we retrospectively reviewed the medical records of trauma patients admitted to the trauma service involved in a motorcycle crash during 2 motorcycle seasons. We examined patient records during a 7-month period before the repeal (April 10, 2011, to November 10, 2011) and compared this to the same 7-month period after the repeal (April 10, 2012, to November 10, 2012). Patients with unknown helmet status were excluded from the study. Data collected included age, sex, helmet status, mortality, ISS, Abbreviated Injury Scale head, intensive care unit (ICU), length of stay (LOS), hospital LOS, mechanical ventilation time, admission Glasgow Coma Scale (GCS), cost of stay, insurance status, alcohol intoxication (blood alcohol content $\geq .08\%$), and disposition. Data were also collected from the Michigan State Department of Transportation to determine crash scene fatalities for motorcyclists in the region served by our hospital.

Statistical analysis

Data were analyzed using SPSS 18 (IBM, Armonk, NY). Summary statistics were calculated. Quantitative data are expressed as the mean \pm SD, whereas nominal data are expressed as a percentage. Comparisons between groups for quantitative variables were performed using the *t* test. Cost data were compared using the Mann–Whitney test. Nominal variables were evaluated using the chi-square test. Significance was assessed at *P* less than .05.

Results

One hundred ninety-eight patients involved in motorcycle crashes were admitted to the trauma service during the study period. Six patients were excluded from our study because helmet status was unknown. There were 165 men (86%), and the average age was 42.9 ± 15.1 years (mean \pm SD). Seventy-nine riders presented before the helmet law repeal (2011) and 113 presented after the helmet law repeal

(2012). Thirty-nine patients were NHMs, 33 of whom were patients admitted in 2012. There were 6 NHMs included in the study before the repeal.

Demographic and clinical data for the 2 groups are shown in Table 1. When comparing the 2011 and 2012 patient cohorts, the 2 groups were not significantly different. However, the percentage of NHM rose significantly from 7% to 29% after the helmet law repeal in 2012 (*P* < .01). There was also a significant increase in before arrival nonhelmeted fatalities in 2012, rising from 14% to 77% after the repeal (*P* < .01).

Table 2 compares the helmeted and nonhelmeted cohorts. There was not a significant difference in mortality rate between these 2 groups. ISS, Abbreviated Injury Scale head, Glasgow Coma Scale, hospital LOS, and insurance status were also not found to be different between the 2 groups. ICU LOS, mechanical ventilation time, and hospital charges were significantly higher in the NHM cohort (*P* < .01). NHMs were more frequently intoxicated (blood alcohol level > .08). There was no statistically significant difference in payor (commercial insurance, private payment, Medicare or Medicaid) between the 2 cohorts (*P* = .85).

Comments

On April 13, 2012, after 35 years of mandatory helmet legislation, state leaders in Michigan approved a partial helmet law. Michigan motorcyclists may go without a helmet if the rider is older than 21 years, obtains a \$20,000 insurance supplement, and has either 2 years of experience or completes a safety course. This law was heavily debated. Advocates voiced concern about lost tourism revenue and violation of personal freedom. Adversaries, on the other hand, expressed worry about the safety impact of repealing an existing mandatory helmet law.

This study revealed 6 significant findings after the repeal of the mandatory helmet law in Michigan. The incidence of NHMs and on-scene fatalities increased. The surviving NHMs required a longer ICU stay and more time on the ventilator. This population was more frequently under the influence of alcohol and used more hospital resources.

There is a strong correlation between mandatory helmet laws and motorcyclist compliance. States that support a mandatory helmet law report compliance up to 94%. Those states without a mandatory helmet law have significantly lower helmet use.^{1,7–9} In the 3 years after the repeal of a

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