Motorcycle helmet

Motorcycle helmets provide protection to adult motorcyclists involved in traffic accidents and their use is associated with a decrease in mortality rates and the risk of head injuries. However, no such protective effect of helmet use was observed for bicyclists involved in collisions [1].

Helmet use in two-wheeled vehicle accidents is widely reported to decrease the rates of death and traumatic brain injury. Previous reports suggest that there exists a trade off with helmet use consisting of an increased risk of cervical spine injury. A review of a national trauma database demonstrated the opposite, with reduction in cervical spinal cord injuries in motorcycle crashes (MCC). In 2000, the State of Florida repealed its mandatory helmet law to make helmet use optional for individuals older than 21 with $10,000 of health insurance coverage. To better ascertain the risks of cervical spine injury with non-helmet use in all two-wheeled vehicles, we analyzed the University of Florida level one trauma center experience. We reviewed the Traumatic injury database over a five-year period (January 1, 2005, to July 1, 2010) for all patients involved in two-wheeled vehicle accidents. Patients were stratified according to vehicle type (motorcycle, scooter, and bicycle), helmet use, and the presence or absence of a cervical spine injury. Outcomes were compared for injury severity, cervical spine injury, cervical spinal cord injury, and presence of cervical spine injuries requiring surgery. Population means were compared using paired t-test. A total of 1331 patients were identified: 995 involved in motorcycle accidents, 87 involved in low-powered scooter accidents, and 249 involved in bicycle accidents. Helmet use was variable between each group. One hundred thirty-five total cervical spine injuries were identified. No evidence was found to suggest an increased risk of cervical spine injury or increased severity of cervical spine injury with helmet use. This fact, in combination with our previous findings, suggest that the law's age and insurance exemption should be revoked and a universal helmet law be reinstated in the state of Florida [2].

Case series

Data of adult patients hospitalized for motorcycle or bicycle accidents between January 1, 2009 and December 31, 2015 were retrieved from the Trauma Registry System. These included 7735 motorcyclists with helmet use, 863 motorcyclists without helmet use, 76 bicyclists with helmet use, and 647 bicyclists without helmet use. The primary outcome measurement was in-hospital mortality. Secondary outcomes were the hospital length of stay (LOS), intensive care unit (ICU) admission rate, and ICU LOS. Normally distributed continuous data were analyzed by the unpaired Student t-test, and non-normally distributed data were compared using the Mann-Whitney U-test. Two-sided Fisher exact or Pearson chi-square tests were used to compare categorical data. Propensity score matching (1:1 ratio using optimal method with a 0.2 caliper width) was performed using NCSS software, adjusting for the following covariates: sex, age, and comorbidities. Further logistic regression was used to evaluate the effect of helmet use on mortality rates of motorcyclists and bicyclists, respectively. RESULTS:

The mortality rate for motorcyclists with helmet use (1.1%) was significantly lower than for motorcyclists without helmet use (4.2%; odds ratio [OR] 0.2; 95% confidence interval [CI]: 0.17-0.37; $p < 0.001$). Among bicyclists, there was no significant difference in mortality rates between the patients with helmet use (5.3%) and those without helmet use (3.7%; OR 1.4; 95% CI: 0.49-4.27; $p = 0.524$). After propensity-score matching for covariates, including sex, age, and comorbidities, 856 well-balanced pairs of motorcyclists and 76 pairs of bicyclists were identified for outcome comparison,

showing that helmet use among motorcyclists was associated with lower mortality rates (OR 0.2; 95% CI: 0.09-0.44; p < 0.001). In contrast, helmet use among bicyclists was not associated with a decrease in mortality (OR 1.3; 95% CI: 0.30-5.96; p = 0.706). The hospital LOS was also significantly shorter for motorcyclists with helmet use than for those without (9.5 days vs. 12.0 days, respectively, p < 0.001) although for bicyclists, helmet use was not associated with hospital LOS. Fewer motorcyclists with helmet use were admitted to the ICU, regardless of the severity of injury; however, no significant difference of ICU admission rates was found between bicyclists with and without helmets.

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Kuo SCH, Kuo PJ, Rau CS, Chen YC, Hsieh HY, Hsieh CH. The protective effect of helmet use in motorcycle and bicycle accidents: a propensity score-matched study based on a trauma registry system. BMC Public Health. 2017 Aug 7;17(1):639. doi: 10.1186/s12889-017-4649-1. PubMed PMID: 28784110; PubMed Central PMCID: PMC5545860.

[2]
Hooten KG, Murad GJ. Helmet use and cervical spine injury: a review of motorcycle, moped, and bicycle accidents at a level 1 trauma center. J Neurotrauma. 2014 Aug 1;31(15):1329-33. doi: 10.1089/neu.2013.3253. Epub 2014 Jun 3. Review. PubMed PMID: 24661125.