
INJURY UPDATE

*A Report to Oklahoma Injury Surveillance Participants**

May 30, 2001

Motorcycle Crash-Related Traumatic Brain Injuries, Oklahoma, 1992-1999

Magnitude of the Problem

Motorcycle crash-related traumatic brain injuries (TBIs) are an important cause of death and disability in the United States (U.S.) and in Oklahoma. In 1999, nearly 2,500 motorcyclists died and 50,000 were injured in traffic crashes across the country. The same year in Oklahoma, 31 motorcyclists were killed and nearly 700 were injured in traffic crashes. In the U.S., motorcycles comprise less than 2 percent of all registered vehicles and account for only 0.4 percent of all vehicle miles traveled. Per mile traveled, persons on a motorcycle are approximately 14 times more likely to die and 3 times as likely to be injured in a crash as occupants of passenger cars.

Motorcycle Helmets and Legislation

Because head injury, which includes TBI, is a leading cause of death and serious disability in motorcycle crashes, helmet use is important. Published reports indicate that by implementing a comprehensive helmet law, which requires riders of all ages to wear a helmet, helmet use rates increase to approximately 99%. According to the National Highway Traffic Safety Administration's (NHTSA) Crash Outcome Data Evaluation System (CODES), helmets are 65% effective in preventing brain injuries. Utilizing the NHTSA Crash Cost Program, the total estimated societal cost in Oklahoma of motorcycle crash injuries is nearly \$42 million a year. The economic savings of a comprehensive helmet law in Oklahoma are estimated at \$6 million annually.

As of January 2001, 20 states, the District of Columbia, and Puerto Rico had laws requiring all motorcyclists to wear a helmet; 27 additional states, including Oklahoma, had laws that applied to some motorcyclists (usually persons under 18 years of age). In Oklahoma, a law requiring all motorcyclists to wear a helmet became effective in 1967. In 1976, the law was repealed for persons 18 years of age and older. Since that time several legislative bills have been introduced to reinstate mandatory helmet use for all persons, however, all have been defeated.

Motorcycle helmets and laws requiring their use are a controversial issue. According to the Insurance Institute for Highway Safety/Highway Loss Data Institute, partial laws are ineffective. In states that require only younger motorcyclists to wear helmets, helmet use is approximately 50% and head injury death rates are twice as high.

A 1996 Oklahoma Highway Safety Office-funded study of motorcycle crash injuries in Oklahoma conducted by the Oklahoma State Department of Health Injury Prevention Service (IPS) found head injury was the

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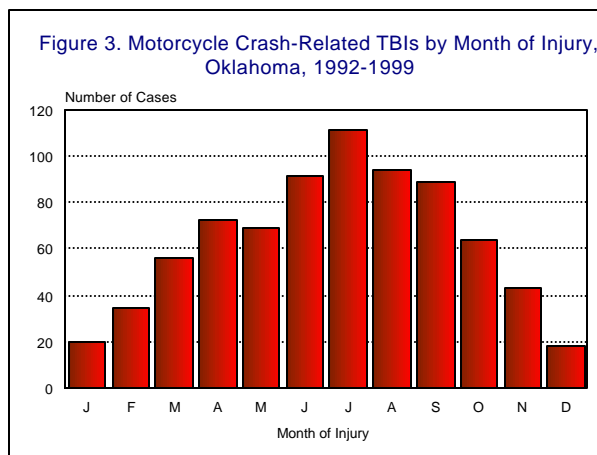
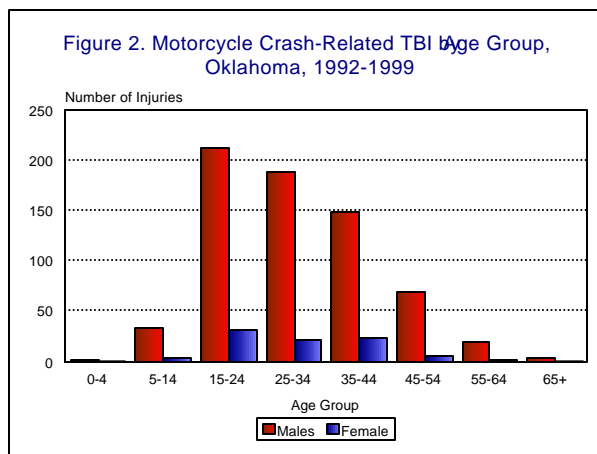
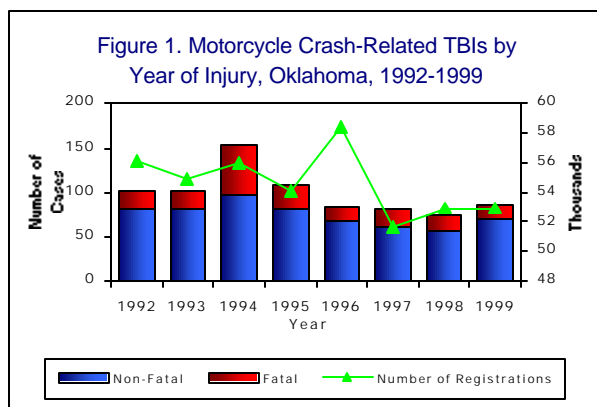
leading cause of motorcycle crash fatality in Oklahoma. Ninety-two percent of persons who suffered a head injury and died were not wearing a helmet. Eighty-seven percent of persons who were wearing a helmet and suffered a head injury sustained a minor or moderate head injury. The same study also found helmets to be 60% effective in preventing any head injury and 75% effective in preventing deaths that involved a head injury.

In spite of the documented effectiveness of motorcycle helmets, many motorcyclists elect not to wear one, particularly in states where the law does not require helmet use. Opponents of mandatory helmet use counter that helmets do not reduce head injuries and may even lead to higher rates of injury by reducing the driver's hearing and visual capabilities. Helmet use adversaries argue that helmets may cause neck injuries. It should be noted that the majority of studies, including two conducted in Oklahoma in 1990 and 1996, did not find this correlation. Opponents further contend that legislation violates the individual's right to freedom of choice.

Epidemiology

Data on hospitalized and fatal traumatic brain injuries (TBI) in Oklahoma have been collected statewide by the IPS since 1992. From 1992 to 1999, there were 762 motorcycle crash-related TBIs sustained by Oklahomans; 167 (22%) injuries were fatal (142 among drivers). During the eight-year period, the number of motorcycle crash-related TBI hospitalizations and deaths declined 16% and 18%, respectively (Figure 1). During this time period, the number of motorcycle registrations declined 6% from 56,107 in 1992 to 52,971 in 1999. The age of persons who suffered motorcycle crash-related TBIs ranged from 4 to 79 years (median 29 years) (Figure 2). Persons 15 to 34 years of age accounted for nearly 60% of injuries and 31% of deaths. Eighty-eight percent (672/762) of injured motorcyclists were males; 95% of injured drivers and 26% of passengers were males. Ninety percent of motorcycle crash-related TBIs occurred among drivers. Whites were more likely to be injured than African Americans or Native Americans (average annual rates 3.2, 1.4, and 1.1, respectively).

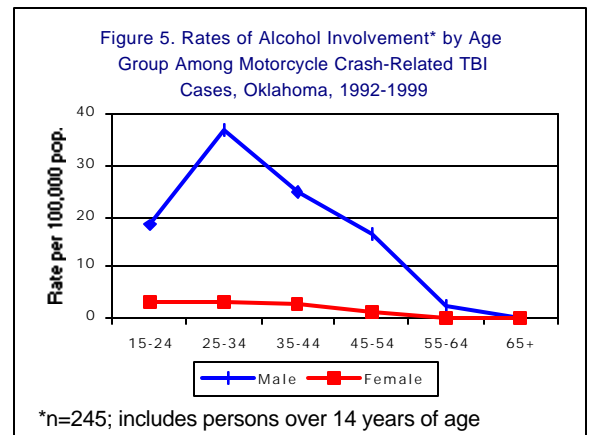
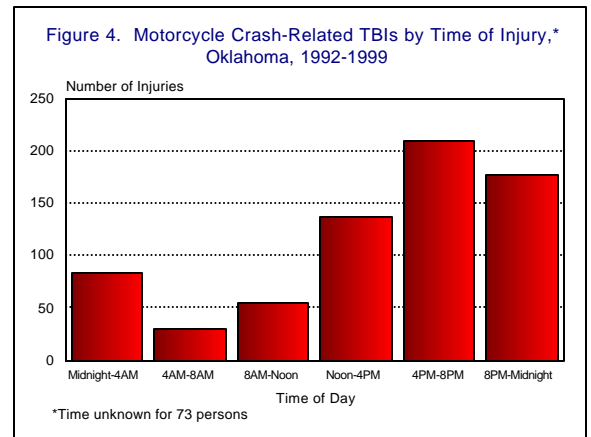
More than two-thirds (526/762) of crashes occurred between April and September (Figure 3). Fifty-six percent (386/689) of injuries occurred between 4 p.m. and midnight (Figure 4). The estimated speed before impact was collected from Department of Public Safety crash reports for 473 of the injuries and deaths; estimated speeds ranged from 0 to 130 miles per hour. Among persons older than 14 years of age, alcohol was a contributing factor in 34% (245/724) of all injuries and deaths. Persons 25-34 years of age had the highest rates of alcohol involvement; 59% of all alcohol-related injuries and deaths occurred among this age group (Figure 5).



As a result of a change in data collection sampling methods in 1999, supplemental medical information was unavailable for 33 (6%) survivors. Among the 562 survivors for whom complete medical information was available, 67% (377/562) were reported to have suffered definite or probable loss of consciousness and 43% (241/562) had post-traumatic amnesia. During the eight-year period, 29% (165/562) of survivors were discharged from the hospital with neurological sequelae such as persistent coma, paralysis, cognitive deficits, and visual impairment. Twenty-five percent (138/559) of survivors who did not reside in a nursing home prior to injury were discharged to an in-patient rehabilitation facility, a skilled nursing facility, another acute care facility, a nursing home, or home health care.

Helmet Use

Helmet use was documented for 82% (626/762) of injured motorcyclists. All analyses on helmet use include only persons for whom helmet status was known. Overall, helmet use was 20%. Helmet use in crashes varied by age, sex, and race. Seventeen percent of riders 18 years of age and older were wearing a helmet compared to 38% of riders less than 18 years of age. Helmet use was significantly higher among males than among females, 22% and 9% respectively. Helmet use was significantly higher among drivers (21%) than among passengers (8%). Twenty-seven percent of whites were helmeted, followed by 15% of Native Americans and 8% of African Americans.



Case Briefs

- A Wisconsin motorcycle passenger enroute to a motorcycle rally in New Mexico removed her motorcycle helmet when she arrived in Oklahoma. Her husband, who was driving the motorcycle, lost control on rainslick pavement. The woman was ejected and suffered massive head trauma, which resulted in her death. Friends riding along with the 42-year old woman reported that when they arrived in Oklahoma she removed the helmet because there is not a law requiring helmet use for persons 18 years of age and older.
- A 31-year old unhelmeted motorcycle driver was traveling 55 miles per hour on a road with a posted speed of 35 miles per hour when he ran into a 2,000 pound bull standing in the middle of the road. The motorcyclist was ejected 82 feet onto the roadway. A passing car swerved to avoid the crash and struck the motorcyclist who died at the scene.
- A 27-year old female was a passenger on a motorcycle that entered a curve at a high rate of speed. The motorcycle driver ran into a car traveling in the opposite direction and both motorcyclists were ejected upon impact. The female motorcycle passenger was found approximately 46 feet from the point of impact. Following a 10-day hospital stay, she was discharged to a rehabilitation facility with TBI-related sequelae. The driver of the motorcycle died at the scene. Neither motorcyclist was wearing a helmet.
- A bystander observed a motorcycle suddenly accelerate to 35 mph. The driver of the motorcycle, a 40-year old male, then struck the rear end of a legally parked vehicle and tumbled off his motorcycle.

The unhelmeted motorcyclist was later found to be under the influence of alcohol, with a blood alcohol concentration of .20 (twice the legal limit), and marijuana at the time of injury. He remained in a persistent vegetative state throughout his 55-day hospital stay and was discharged to a nursing home.

- A 21-year old male traveling at a high rate of speed lost control of his motorcycle and struck a tree. The motorcyclist, who was wearing a helmet, sustained a concussion. He was discharged home with no apparent neurological sequelae after a one-day hospital stay.
- A 44-year old intoxicated, unhelmeted motorcycle driver was diagnosed with cerebral lacerations and multiple fractures, after losing control of his motorcycle while negotiating a curve in the road. He required hospital care for eight days before being discharged home.
- A 6-year old male was hospitalized for two days after he sustained an intracranial injury, scalp lacerations, and abrasions to the arms, back, and buttocks. The child had fallen off the back of a motorcycle traveling approximately 15 miles per hour. He was not wearing a helmet at the time of injury.
- A 16-year old male was a passenger on a motorcycle being driven by a relative. Neither was wearing a helmet. A pickup truck hauling a 16-foot trailer pulled out of a private drive and the motorcycle collided with the trailer. The passenger of the motorcycle was ejected 53 feet from the point of impact. He sustained an intracranial injury and a skull fracture and was discharged to a rehabilitation facility with cognitive deficits, seizures, and difficulty walking. The motorcycle driver was pronounced dead at the scene.

Prevention

The following are a few recommendations to help reduce motorcycle crash-related injuries and deaths:

- Always wear a helmet.
- Obtain an appropriate license to operate a motorcycle. (Oklahomans are required by law to obtain an endorsement to operate a motorcycle.)
- Never drink alcohol before operating a motorcycle.
- Follow the rules of the road and obey the speed limit.
- Watch for road hazards, such as large cracks, holes, and bumps.
- Watch for vehicles coming from driveways and side streets.
- Make sure headlights are on every time you ride.
- Take a motorcycle safety course. To locate a course near you, call 1-800-446-9227.

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