

# INJURY UPDATE

*A Report to Oklahoma Injury Surveillance Participants\**

September 28, 2001

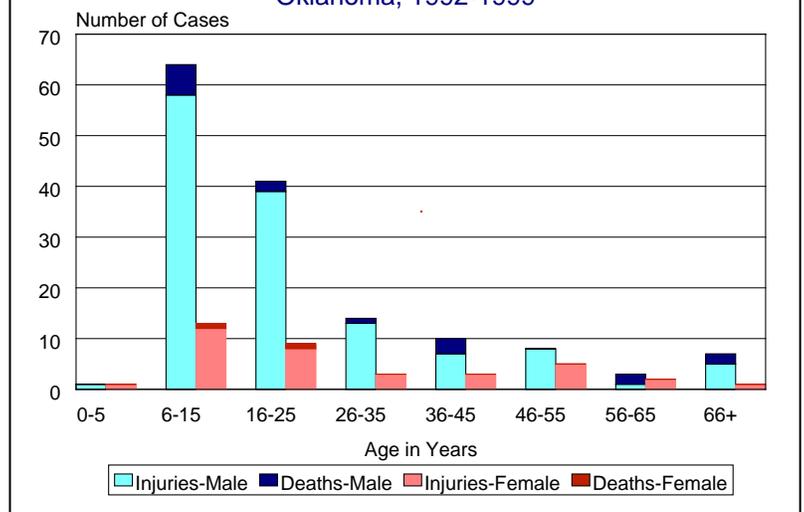
## All Terrain Vehicle-Related Traumatic Brain Injuries, Oklahoma, 1992-1999

All-terrain vehicles (ATVs) are three- and four-wheeled motorized vehicles with wide balloon tires designed for use on all types of off-road terrain; many can travel at speeds in excess of 60 miles per hour. Although they appear stable, their high center of gravity and poor or absent suspension system may render them difficult to control. Three-wheeled ATVs are particularly unstable, especially on hard surfaces. An ATV handles differently from other vehicles, including motorcycles and cars. A collision or rollover can occur quickly, even during routine maneuvers such as turning and driving on hills and over obstacles.

ATVs were introduced in the early 1970's for use as transportation for farmers, lumberjacks, and others involved in similar work activities requiring travel on unpaved terrain. However, since the mid 1980's, their popularity as recreational vehicles has increased. Within two years of being marketed as a recreational vehicle, the rate of injury increased exponentially. There are almost 4 million ATVs currently in use in the United States.

Manufacturers ceased production of three-wheeled ATVs in 1988 as a result of the excessive mortality attributed to this type of ATV; however, those already on the market were not recalled. During that same year, in addition to pressuring ATV manufacturers to halt production of three-wheeled ATVs, the Consumer's Product Safety Commission (CPSC) negotiated consent decrees (CDs) between the CPSC, the Department of Justice, and each of the five manufacturers of ATVs. Legally binding for a 10-year period, the CDs required that these manufacturers: 1) recommend that not more than one person ride an ATV at a time; 2) create guidelines regarding engine and machine size for younger drivers; 3) develop and offer free safety courses to beginning drivers; 4) discourage travel on roadways; 5) require adult supervision of child operators younger than 16 years of age; and 6) require helmet use. The CDs expired in 1998, and there has been a concomitant rise in ATV-related deaths and injuries. The CPSC is currently working toward implementing new CDs to reduce deaths and injuries among ATV operators.

Figure 1. ATV-Related TBI by Age Group, Sex, and Outcome, Oklahoma, 1992-1999



\*The INJURY UPDATE is a report produced by the Injury Prevention Service, Oklahoma State Department of Health. Other issues of the INJURY UPDATE may be obtained from the Injury Prevention Service, Oklahoma State Department of Health, 1000 N.E. 10<sup>th</sup> Street, Oklahoma City, Oklahoma 73117-1299, 405/271-3430 or 1-800-522-0204 (in Oklahoma). INJURY UPDATES and other IPS information is also available at <http://ips.health.ok.gov>.

## EPIDEMIOLOGY

Since 1992, the Injury Prevention Service of the Oklahoma State Department of Health has conducted statewide surveillance of all traumatic brain injuries (TBIs) that resulted in death or hospitalization. In Oklahoma from 1992 to 1999, 185 persons sustained ATV-related traumatic brain injuries; 18 (10%) injuries were fatal. During the eight-year period, an average of 23 ATV-related TBI hospitalizations occurred annually. However, one year following the expiration of the CDs, the number of hospitalizations increased 81%, from 21 in 1998 to 38 in 1999. Eighty percent of injuries occurred among males. Whites accounted for 93% of injuries. The average age of injured persons was 24 years (range 3 to 81 years). Children 6-15 years of age accounted for 39% (7/18) of deaths and 42% (70/167) of injuries (Figure 1), with an injury rate nearly three times the overall rate (average annual rates 2.0/100,000 and 0.7/100,000, respectively). Injuries peaked in May and were highest from April through October (Figure 2). Of the 78 (42%) persons for whom helmet use was documented in the medical record, 10 (13%) were wearing a helmet at the time of injury. Sixty-eight percent of injured persons were riding a four-wheeled ATV, 31% were injured while riding a three-wheeled ATV, and 1% were injured while riding an ATV with an unspecified number of wheels. The mechanism of injury was known for 149 persons; collisions and rollovers each accounted for approximately 33% of injuries. Twenty-one (43%) collisions involved another vehicle, including other ATVs, and 28 collisions (57%) occurred as a result of striking a stationary object, such as a tree or rock. Thirty-four injuries (23%) occurred when persons were ejected from the vehicle with no mention of colliding with a moving or stationary object (Figure 3).

Among the 149 survivors for whom complete medical information was available, 70% (105/149) suffered definite or probable loss of consciousness and 42% (63/149) experienced post-traumatic amnesia. Thirty-five percent (38/108) of persons aged 14 years and older were tested for the presence of alcohol; 29% (11/38) tested positive. Hospital stays ranged from 1 to 39 days, with an average length of 5 days. During the eight-year period, 17% (26/149) of survivors were discharged from the hospital with neurological sequelae, such as abnormal reflexes and muscle weakness, hearing and speech impairment, cognitive deficits, and blindness. Thirteen percent (22/167) of survivors were discharged to rehabilitation, skilled nursing, other acute care, a nursing home, or required home health care.

Figure 2. ATV-Related TBIs by Month of Injury, Oklahoma, 1992-1999

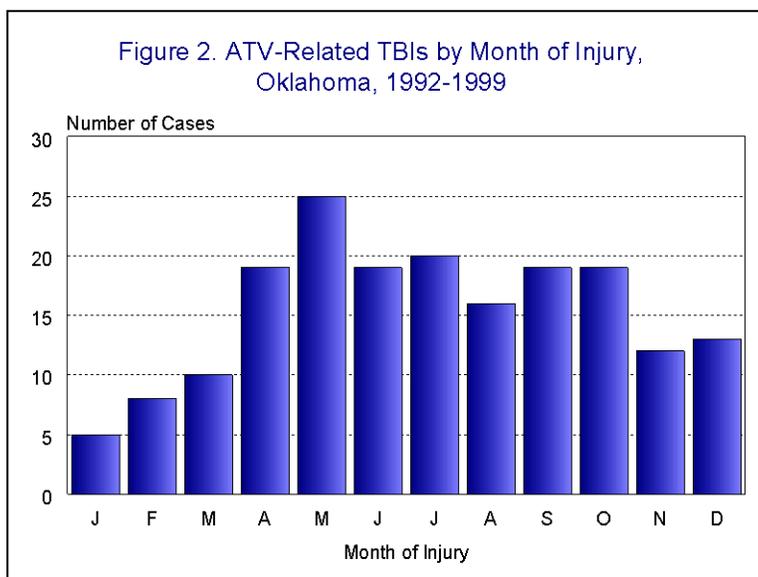
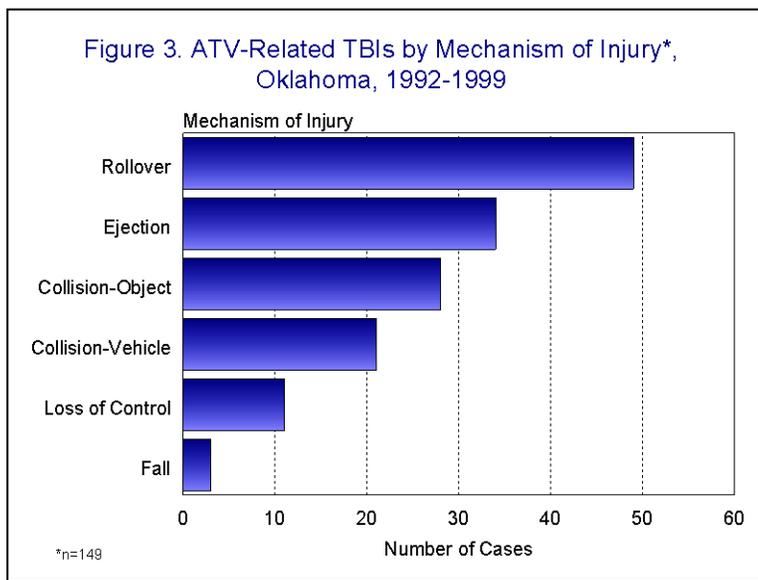


Figure 3. ATV-Related TBIs by Mechanism of Injury\*, Oklahoma, 1992-1999



## CASE BRIEFS

- An unhelmeted 11-year old boy drove a three-wheeled ATV from a private driveway into the path of an oncoming automobile. When the vehicle hit him, he was ejected and came to rest 151 feet from the point of impact. He died the next day as a result of his head injuries.
- An unhelmeted 39-year man was using a three-wheeled ATV to round up cattle. He was somehow knocked off, struck his face on a cow, and lost consciousness for an unknown period of time. While rounding up cattle later that day, he was again thrown off the ATV, this time landing on his head. He suffered an intracranial injury and was released from the hospital two days later.
- A 37-year old man driving a four-wheeled ATV at a high rate of speed swerved to avoid an object, causing the ATV to roll over. He experienced a brief loss of consciousness and sustained a skull fracture. He was discharged to a rehabilitation facility after a three-day hospital stay.
- A 28-year old man was driving a four-wheeled ATV at an unsafe speed on the motorcycle trails of a state park. While accelerating to travel a ramp, he struck an embankment causing the ATV to become airborne until it landed 39 feet from the initial point of impact. The driver, who had a blood alcohol concentration twice the legal limit, was then ejected an additional 36 feet. The ATV flipped over and finally came to rest on top of him. He was treated at the hospital for 4 days after being diagnosed with a skull fracture and multiple other injuries.
- A 48-year old unhelmeted female driver rear-ended another four-wheeled ATV. She was ejected and the ATV rolled over her. She was diagnosed with multiple skull fractures, an intracranial hemorrhage, and a midline shift of the brain. Following a 19-day hospital stay, the woman, who remained in a semi-comatose state, was discharged to a rehabilitation facility for further treatment.
- An 11-year old boy who was riding a four-wheeled ATV with a friend, ran into a tree. The 11-year old was transported to a hospital, where a computed tomography (CT) scan revealed diffuse edema of the brain. He seemed to be recovering, when he suddenly had emesis followed by a severe headache two days after the injury. His head injury rapidly worsened, and he was pronounced dead the next day. He was not wearing a helmet.

## PREVENTION

An ATV can be hazardous to operate, but many ATV-related injuries can be prevented if the following safety precautions are heeded:

- Never operate an ATV without an approved motorcycle helmet, eye-protection, boots, gloves, long pants and a long sleeved shirt or jacket.
- Always properly secure helmet.
- Never consume alcohol or drugs before or while operating an ATV.
- Always read the owner's manual carefully and follow the operating procedures described.
- Always supervise operators younger than 16 years old.
- Never carry a passenger. Passengers may upset the balance of the ATV.

- Never operate an ATV on pavement. ATVs are not designed for use on paved surfaces and may be difficult to control.
- Never operate an ATV at excessive speeds.
- Complete a training course to learn how to operate an ATV safely. To locate a class near you, call 1-800-887-2887.

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