

CONSUMER PRODUCT SAFETY COMMISSION

Washington, D.C. 20207

MEMORANDUM

DATE: January 7, 1998

TO : Troy W. Whitfield, ES

Through: Dr. Mary Ann Danello, AED
Directorate for Epidemiology and Health Sciences
Dr. Susan W. Ahmed, Director, EHHA
Hazard Analysis Division

FROM : Prowpit Adler, EHHA

Subject: Go-Cart/Fun-Kart Related Injuries and Deaths, 1985-1996.

This memorandum provides data on injuries and deaths related to go-carts/fun-karts from January 1985 through December 1996. The report concentrates on the incidents among children under 15 years old. The injury data are based on the National Electronic Injury Surveillance System (NEISS) including follow-up telephone investigations conducted during a 2-week period in 1994. The data on deaths are from death certificates, news clippings, and medical examiners' reports including 45 in-depth investigations of the fatalities reported from 1990 through 1996.

1. Injuries

A. National Estimates

An estimated 125,900 go-cart/fun-kart related injuries, an average of 10,500¹ injuries per year, were treated in U.S. hospital emergency rooms during the subject 12-year period. About 81,300 injuries (65%) were to children under 15 years old (Table 1). There was a significant increase in number of injuries to children over this period.² For children, head and face injuries (including eyelid, eye area, and nose) accounted for about 21 percent, upper body parts 38 percent, lower body parts 35 percent, and the remaining 6 percent of the injuries were to all parts of body. The more severe injuries to head and face such as hemorrhages, crushing, concussions, and hematomas accounted for about 14 percent. The rate of hospitalization to children

¹ The 95 percent confidence interval around the estimated injuries is 7,365 to 13,435.

²The annual number of injuries to children increased significantly at a rate of 680 injuries per year ($p=0.0002$; the 95 percent confidence interval for the annual increase is between 445 and 915).

under the age of 15 years old was about 3 percent³ compared to the overall 5 percent hospitalization rate to all ages.

Table 1
Distribution of Go-Cart/Fun-Kart Related Injuries
By Age, 1985-1996

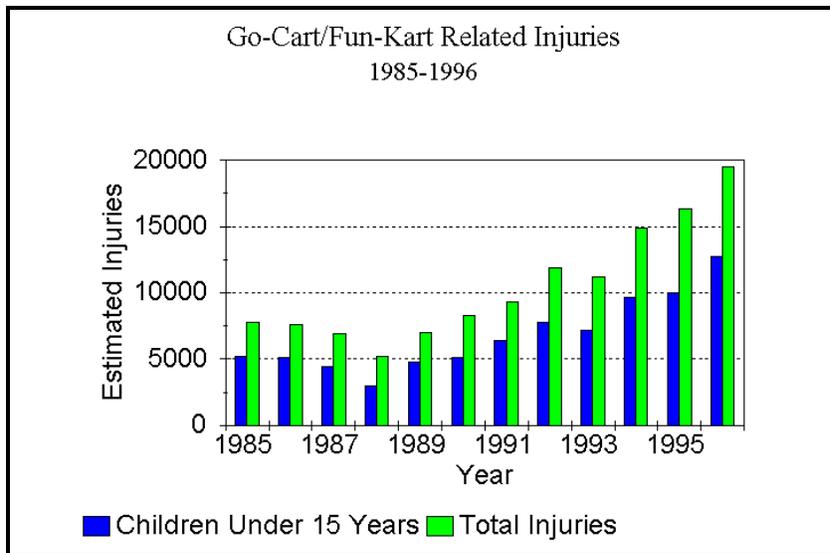
Year	Under 15 yrs.	15 yrs. & Older	Total
1985	5,200 (67%)	2,600	7,800
1986	5,100 (67%)	2,500	7,600
1987	4,400 (64%)	2,500	6,900
1988	3,000 (58%)	2,200	5,200
1989	4,800 (69%)	2,200	7,000
1990	5,100 (61%)	3,200	8,300
1991	6,400 (69%)	2,900	9,300
1992	7,800 (66%)	4,100	11,900
1993	7,200 (64%)	4,000	11,200
1994	9,600 (64%)	5,300	14,900
1995	10,000 (61%)	6,300	16,300
1996	12,700 (65%)	6,800	19,500

³An estimated 158 children died prior to/upon arrival at the hospital emergency rooms during the 12-year period.

Total	81,300 (65%)	44,600	125,900
--------------	---------------------	---------------	----------------

Source: U.S. Consumer Product Safety Commission (CPSC), National Electronic Injury Surveillance System (NEISS), January 1, 1985 - December 31, 1996, Directorate for Epidemiology and Health Sciences, Hazard Analysis Division.

Figure 1



B. Hazard Patterns

Based on the most recent incidents reported from 1994 through 1996, the injuries associated with go-carts/fun-karts were classified by the following hazard patterns:

- o Collision - with stationary objects or other go-carts or motor vehicles.
- o Fell/thrown
- o Tipover
- o Hit/runover
- o Entrapment - either hair or clothing caught in exposed engine or chain drive.
- o Other - burns from hot engine, exposed exhaust pipe, debris in eyes, or cut on a sharp object on carts.
- o Unknown - A high percentage of the incidents in this category was described as "wrecked" which may have been the result of tipping over or collision.

These classifications are presented in Table 2.

Table 2
Percent Distribution of Injuries Associated with
Go-Carts/Fun-Karts by Hazard Patterns, by Year
Children Under 15 Years
1994-1996

Hazard Pattern	Year		
	1994	1995	1996
Collision	27%	24%	23%
Fell/Thrown	13%	25%	20%
Tipover	9%	10%	9%
Hit/Runover	6%	7%	10%
Entrapment	4%	2%	3%
Other	18%	15%	14%
Unknown	23%	17%	21%
Total	100%	100%	100%
Estimate	14,900*	16,300*	19,500*

Source: U.S. Consumer Product Safety Commission (CPSC), National Electronic Injury Surveillance System (NEISS), January 1, 1994 - December 31, 1996, Directorate for Epidemiology and Health Sciences, Hazard Analysis Division.

*The coefficient of variations (CVs) for 1994, 1995, and 1996 estimates are 0.14, 0.15, and 0.14, respectively and the sample sizes are 293, 326, and 399 injuries.

Table 2 shows that most of the injuries to children under the age of 15 years were associated with collisions and falling

or being thrown off the carts. The numbers of injuries associated with tipovers, hits/runovers, or entrapments were considerably lower.

C. Telephone Follow-up of Selected NEISS Cases in 1994

Twenty-five cases (out of the total 293 cases reported through NEISS) were systematically selected for the telephone follow-up investigations. The purpose for these investigations was to evaluate the characteristics of the carts and the victims. The results show:

- o About one-third of the incidents involved home-made units.⁴
- o About two-thirds of the incidents involved go-carts that were equipped with at least one safety device, such as a safety belt, steering wheel pads, or chain guard.
- o In more than half of the incidents, the go-carts hit a stationary object or a moving vehicle.
- o About two-thirds of the victims were children under 15 years old.

2. Deaths:

The reported deaths presented in this section were obtained from news clippings, death certificates, consumer complaints and letters, medical examiner reports, and other government agency referrals reported to CPSC. While they include useful information, the reported deaths are not a sample of known probability for all go-cart/fun-kart related deaths that may have occurred. Also, CPSC mortality reporting was not complete for 1996. Thus, the number of deaths reported to the Commission is probably an undercount.

There were 231 go-cart/fun-kart related deaths of all ages, reported to CPSC from these sources during the years 1985- 1996. One hundred and fifty-five cases (67%) were to children under the age of 15 years old.

Information from 45 completed investigations of deaths to children under 15 years, between 1990 and 1996, are described according to 6 scenarios. These scenarios are described by 6 primary hazard patterns: collision with stationary objects or motor vehicles, tipover, jumps/stunts, entrapment, over

⁴The Directorate for Economic Analysis reported that of the estimated 1.3 million units in use (in 1994), firms in the industry estimated that perhaps 35-40 percent of these are homemade.

incline/bank/wall, and fell/thrown.

Head injury was listed as the cause of death in over half of these fatalities. Other causes of death were broken necks, chest injuries, abdominal injuries, internal injuries, burns, asphyxiation, or combination of head and chest injuries.

Collision (27 cases)

A 3-year-old boy died of multiple chest injuries after he was crushed against the steering wheel of a go-cart driven by his brother when the go-cart collided with a parked tractor. He had been sitting on his brother's lap.

A 4-year old girl died from chest injuries sustained when a 4-wheel ATV hit and ran over the go-cart in which she was riding with her father.

A 6-year-old girl died of severe head injuries. The victim was driving a go-cart in a circular driveway of her parents' mobile home trailer at approximately 15 miles per hour. She drove the vehicle into the bottom of her parent's trailer.

A 6-year-old girl was driving a go-cart in the front yard of her aunt's home when she lost control of the cart, went into the street, and was struck by on-coming traffic. The victim expired in the emergency room of a local hospital an hour later as a result of a fractured neck.

A 6-year-old girl died due to massive chest injuries while riding on the lap of her mother who was driving the go-cart. The go-cart struck a retaining barrier head-on at 15-20 mph. The victim was pinned between her mother's chest and steering wheel.

A 7-year-old boy (driver) died and an 8-year-old girl (passenger) suffered brain injuries when their go-cart travelled down an embankment at 10 mph onto a paved highway. They went into the path of a pick-up truck travelling at about 50 mph.

A 7-year-old boy died after a go-cart collided with a bumper rail of the go-cart track. He had been riding with his father in the same go-cart and his father's body may have pressed him into the steering wheel. The cause of death was a ruptured aorta.

A 7-year-old boy died of blunt force injuries of the abdomen when he hit a 6-8 inch curb while driving a homemade go-cart. The vehicle did not have any safety straps. The victim wore a helmet.

An 8-year-old girl died of injuries after the go-cart she was driving was hit and run over by a pick-up truck pulling a boat. The accident occurred at dusk and the go-cart did not have any lights.

An 8-year-old boy sustained fatal head and chest injuries when his go-cart went out of control and struck the axle on a tractor trailer. The victim was transported to an emergency room and was pronounced dead on arrival.

An 8-year-old boy was riding as a passenger with a 25-year-old male on the go-cart down a gravel road. The driver pulled

out of an intersection and struck a car. Both the driver and the passenger of the go-cart were thrown onto the road. The driver of the go-cart received severe head injuries and the boy was killed.

An 8-year-old boy was driving his go-cart about the parking lot and grounds of an auto facility. He lost control of the cart and crashed into a parked truck. The victim, who was under his father's supervision during the drive, died of cranial injuries after hitting the truck's steel bumper.

A 9-year-old girl was driving her go-cart near a pipe fence. She inadvertently depressed the throttle pedal instead of the brake. She drove the cart under the fence, received multiple head injuries, and died.

A 9-year-old boy was riding a go-cart on private land when he ran into the back end of a utility trailer. He died of head and internal injuries.

A 10-year-old boy drove a go-cart from a driveway of his home into the side of the pick-up truck moving along a rural road. The impact with the truck broke the boy's neck and he died at the accident site. He was wearing a helmet when the accident occurred.

A 10-year-old boy died from massive blunt head trauma while driving a homemade go-cart in a high school parking lot when he struck a 15 inch high metal chain which was blocking a dead-end access road behind the school. The victim, who was not wearing a helmet was driven to the hospital where he died a short time later. A passenger on the go-cart sustained a deep laceration to his neck.

A 10-year-old boy died from extensive head injuries when the go-cart he was driving struck a curb on a paved street, flipped over and landed on top of him. The victim was not wearing a helmet.

An 11-year-old girl died after crashing her go-cart into a parked truck. The medical official believed she may have gone under the truck and hit her chest on the truck bed.

An 11-year-old boy was struck by a vehicle while riding a go-cart. He pulled out of a private driveway into the path of the vehicle traveling on an asphalt county road. The victim was transported to the hospital where he died due to skull fracture.

A 12-year-old girl died from head injuries when a 2-wheel motorcycle collided with the left side of her go-cart as she attempted to make a right turn out of her gravel driveway onto the south bound lane of a paved road. She was not wearing a helmet and was pronounced dead at the hospital.

A 13-year-old girl was driving a go-cart on the go-cart track when her vehicle hit the tires that were located in a turn beside the track. The vehicle's front end went up, threw the victim out, and came to rest on the victim. She died of a massive basal skull fracture. The victim did not wear a safety belt or a helmet at the time of the accident.

A 13-year-old boy was fatally injured when the home-made go-cart he was operating failed to stop for a stop sign on a paved state road. His vehicle was struck broadside by a car passing through the intersection.

A 13-year-old boy was killed when he lost control of the 4 horsepower go-cart he was driving. The victim was struck in the chest by a broken limb. The limb transected his aorta. A passenger friend was not injured.

A 13-year-old boy was killed when he drove a go-cart into the path of a truck, after he had failed to stop at a stop sign at an intersection. He died of blunt head trauma. A 12-year-old male passenger was hospitalized for a broken collar bone.

A 13-year-old boy died from blunt force injuries to his trunk when he drove a go-cart into the right front bumper of his father's parked car and got his chest caught between the high back go-cart seat and the bumper. The victim had driven out of his father's automotive shop at a high rate of speed and failed to negotiate a right turn.

A 13-year-old boy, a passenger, died from head injuries when the go-cart struck a metal chain strung across a road. The sun may have impaired the 13-year-old driver's vision. The victim died at the scene. The diver was taken to the hospital. Both were wearing a helmet.

A 14-year-old boy was killed when the go-cart he was driving struck a bus. He drove through a stop sign at an intersection of two paved streets. He hit the bus on its side and was thrown under the bus rear wheels.

Tipover (9 cases)

A 5-year-old boy was driving a go-cart around the yard in the vicinity of his home, lost control of the vehicle after hitting a tree root. The vehicle overturned and the victim hit his head on the cart. His father, who witnessed the accident, found him bleeding from the head and unconscious. He died two days later without regaining consciousness.

A 5-year-old boy died from third degree burns and inhalation

injuries and the 10-year-old driver received third degree burns over 95% of his body from a fire caused by a go-cart accident. The go-cart turned over into a ditch from a rural paved street. It caught fire when the gas tank erupted spilling gas on the hot engine.

An 8-year-old boy died from head injuries after the go-cart he was driving at a commercial track flipped over and landed on top of him.

An 8-year-old boy died from head injuries received when the go-cart overturned and pinned him underneath. He was riding alone and unsupervised. He was not wearing a helmet or other safety equipment.

An 8-year-old boy died of injuries when the go-cart he was riding overturned, pinning him to the ground, and spilling gasoline onto him. He was not wearing a helmet. The cause of death was identified as cardio-pulmonary arrest due to anoxic brain death.

A 12-year-old boy overturned his go-cart coming out of a turn at a race track. He was thrown from the go-cart and landed face down on the dirt track. The go cart struck him in the back causing severe internal injuries. He died within an hour of the incident. The victim was wearing a helmet, but was not wearing a safety belt per racing association rules.

A 13-year-old boy was found unconscious in the overturned vehicle with severe head injuries. The victim was transported to a local hospital by his father. He never regained consciousness and was pronounced dead.

A 14-year-old boy sustained a fatal blunt chest trauma injury after his go-cart flipped over and landed on top of him. The victim was wearing a helmet at the time of the incident. He was transported to a local hospital where he died in the emergency room.

A 14-year-old boy died after he sustained a massive head trauma when his go-cart rolled over several times with him in it. The left tire of the cart dug into the grass as he was turning right.

Jump/Stunt (4 cases)

An 8-year-old boy died due to head and chest injuries when his go-cart flipped over on top of him while attempting to jump over car ramps. The front end of the cart dug into the dirt causing the cart to flip over and land on top of the victim.

A 10-year-old boy was attempting to ride a 5 horsepower go-cart over a mound of dirt about 3 feet high and 4 feet wide. The front bumper struck the dirt and the cart flipped forward over

the mound of dirt and landed on top of him. He died of head trauma.

A 13-year-old boy sustained fatal head injuries when his go cart went over a dirt jump at high speed. The nut holding the wheel assembly to the cart came off during the jump causing the cart to overturn upon impact.

A 14-year-old died from head injuries after he was ejected from the go cart he was driving. The vehicle turned over on top of him and the roll bar struck him in the head. The victim was doing a high speed stunt in a vacant concrete parking lot when the accident occurred. He was not wearing a helmet and did not have a seat belt secured around him.

Entrapment (2 cases)

A 9-year-old girl was driving a home-made go-cart in the parking lot of the local school. It appears she was attempting to turn around and was leaning to her left. As she leaned, her hair got caught in the drive shaft which was located behind the seat. The drive shaft wrapped up her hair and caused her head to strike the metal assembly. She received traumatic head injuries from which she died, during treatment at the hospital.

A 9-year-old died from asphyxiation 3 days after her hair got caught in the sprocket of a go-cart as she drove the vehicle down a public dirt road. The victim's long straight hair flowed behind her as she drove and got caught in a half inch opening in the motor behind her seat.

Over Incline/Bank/Wall (2 cases)

A 10-year-old boy died when his go-cart went over an incline and became airborne. The front end of the cart hit the ground and the cart flipped forward over on top of the victim. He died of a crushing head injury.

A 7-year-old boy was driving his go-cart for the first time in an open field near an embankment. He accidentally drove the cart over the embankment which resulted in his death due to massive head injuries.

Fell/Thrown (1 case)

A 13-year-old girl died of a basal skull fracture when she fell backwards from the rear of a 5 horsepower go-cart on to a blacktop street. She was riding on the cart by holding onto the cage which covered the motor while her cousin was driving at a slow speed at the time of the incident.

Based on these incident scenarios, wearing helmets may have prevented at least 20 of the fatal head injuries described in the report. Safety devices such as belt guards, chain guards, and engine guards may have prevented entrapment incidents such as those described in the report.