

variations in the type or frequency of drug use among pedestrian casualties over time. Answers to these questions must await subsequent analyses of the MTOS data base.

### **Bicycles**

There were 802 bicycle injuries reported to MTOS, 4.7 percent of which were mortal. Stabbings and falls had similar mortality rates, at 4.5 percent and 5.5 percent, respectively. The average length of hospital stay was 7.4 days. Comparable lengths of hospitalization were seen for stabbings (5.2 days) and gunshot wounds (9.2 days). Patients' ages ranged from infancy to 79, and the majority were between 5 and 34. Mortality was bimodally distributed: both the very young and the very old were more likely to die from their injuries.

There were 285 bicycle patients (35.5 percent of the total) tested for BAC. Seventy-four (26 percent) of them tested for measurable amounts in their systems at the time of test. There were 16 cases (5.6 percent) at the .01-.099 percent BAC level, 26 (9.1 percent) at the .10-.199 percent level, 23 (8.1 percent) at the .20-.299 percent level, and 9 (3.2 percent) at .30 percent or higher. There were five fatalities among those with alcohol present at the time of injury, which represents 6.8 percent of the bicycle injury cases known to have alcohol involvement. This is a slightly greater proportion of fatalities than the total percentage of fatalities for bicycle riders in the MTOS data base, which is 4.7 percent, but smaller than the percentage of those tested for alcohol where no alcohol was found. This latter group's mortality rate is 9 percent.

Drug screening was conducted for 103 cases. Eleven cases were found to indicate the presence of drugs at the time of injury, with cocaine, barbiturates, and amphetamines predominant. Each of these drugs was present in 2.9 percent of the screened bicycle cases. As was true for the pedestrian cases, we do not know the distribution of cases for which both drugs and alcohol were present, nor do we know whether there were annual variations in types of drugs used.

### **CONCLUSIONS**

The study of survivable major trauma in motor vehicle crashes is occurring with more frequency now that the public health community's attention is increasingly focused on the consequences of injury. However, bicyclists and pedestrians are not yet getting the attention that their injury incidence demands. As bicycle riding becomes more common in the United States, more attention should be focused on bicyclists' injuries.

Furthermore, these findings suggest that routine testing (or reporting and recording of test results) for alcohol and other impairing drugs is infrequent within the major trauma care environment. Despite the fact that fewer than half the pedestrian cases were tested for alcohol, for example, more than half of those tested had measurable quantities of alcohol in their system at the time of injury. This fact has significant clinical implications; alcohol testing should become part of the routine assessment of care needed for trauma patients.

### **DRUG PRESENCE IN FATALLY INJURED TRUCK DRIVERS**

**Barry M. Sweedler**

**National Transportation Safety Board**

---

#### **ABSTRACT**

National Transportation Safety Board (NTSB) conducted a year-long study of 182 heavy-truck crashes in which the driver was fatally injured and found that 33 percent of the drivers tested positive for drugs of abuse. The most prevalent drugs found were marijuana and alcohol (13 percent each), followed by cocaine (9 percent), methamphetamines/amphetamines (7 percent), other stimulants (8 percent), and codeine and phencyclidine (PCP) (less than 1 percent each). Forty-one percent of those drivers positive for drugs of abuse were found to be multiple-drug users. Almost 11 percent tested positive for three or more drugs of abuse.

#### **INTRODUCTION**

To develop an estimate of drug and alcohol use among fatally injured drivers of heavy trucks, NTSB collected data on all fatally injured drivers of trucks weighing more than 10,000 lb gross vehicle weight (GVWR) in eight states for 1 year. "Fatally injured" is defined as being dead at the scene or within 4 hr of the accident. The states, selected to provide a geographic mix, were California, Colorado, Georgia, Maryland, New Jersey, North Carolina, Tennessee, and Wisconsin. The study period ran from October 1, 1987, to September 30, 1988. The full study is in press.

#### **STUDY METHODOLOGY**

So that as many as possible of the truck accidents that met the criteria could be included in the study, notification procedures were coordinated with state

police and the chief medical examiner. Upon notification of an accident that met the criteria, an NTSB highway accident investigator was sent to the scene to document the facts and circumstances and to gather information enabling NTSB to determine the probable cause of the accident. The investigator contacted the coroner or medical examiner and arranged to receive biological specimens for toxicological testing. NTSB provided "tox kits" for collecting blood and, if there wasn't enough blood, vitreous fluid. Using standard chain of custody methods, the samples were forwarded on ice, by express mail, to the Center for Human Toxicology (CHT) at the University of Utah for screening, confirmation, and quantification. The CHT tests searched for the presence of 44 drugs in the following classes: volatiles and gases, sedatives and tranquilizers, stimulants, opiates, antihistamines, hallucinogens, marijuana, analgesics, and anticonvulsants. A grant from the National Institute on Drug Abuse (NIDA) paid for the testing at CHT.

For each accident, the investigators developed information to describe completely the driver(s), vehicle(s), and roadway at the time of the accident. The investigator also interviewed representatives of the trucking company, available witnesses, and members of the driver's family to obtain more detailed data on hours of service, fatigue, carrier operations and maintenance, training and testing, preemployment screening, and other factors.

By developing such data, NTSB was able to determine the role that any drug found in the driver's system may have had in causing the accident.

To assist in this task, NTSB, in conjunction with NIDA and CHT, convened three scientific review panels made up of eminent forensic toxicologists and experts on the effects of drugs on human performance. The panels provided guidance on whether impairment occurred as a result of drug use and what role alcohol or other drug impairment may have had in the accident.

## FINDINGS

During the study period, NTSB investigated 182 accidents involving 186 trucks. In one accident it could not be determined which of the two occupants was driving, so it was decided to exclude the case. Therefore, the analyses that follow include data on 185 drivers. As far as could be determined, the 182 accidents include all the accidents that took place in the eight states during the study period and met the established criteria. They represent about 25 percent of the heavy-truck accidents that occurred across the nation in that period.

NTSB considers the number of accidents in the study

to be a significant portion of the total accidents that occurred, but it does not suggest that the sample is statistically representative of such accidents nationwide. In addition, NTSB does not suggest that heavy-truck accidents that are fatal to the driver are representative of all truck accidents. However, NTSB believes that because of the large sample the findings are representative of heavy-truck accidents nationwide in which the driver is fatally injured.

## Toxicological Test Results

NTSB was able to obtain biological specimens for toxicological testing by CHT for 168 (or 91 percent) of the 185 fatally injured drivers. Late notification was the reason that most of the 17 cases lacked specimens. In an additional 16 cases, samples were too small to test for certain drugs on the analytic plan. Rather than lose valuable data, the board chose to include in the analysis the cases in which CHT testing was carried out for most, but not all, drugs in the analytic plan. Thus, the sample sizes vary somewhat from drug to drug.

Of the fatally injured drivers for which CHT tests were performed, 112 tested positive for one or more of the drugs on the analytic plan. Of these, 56 drivers tested positive for drugs of abuse. This is 33.3 percent of the 168 cases for which at least partial toxicological results were obtained.

## Drugs of Abuse

No barbiturates and no benzodiazepines (diazepam, flurazepam, and chlordiazepoxide) were identified in the fatally injured truck drivers. This is not unexpected, because these drugs function as sedatives, hypnotics, or anxiolytics that relax muscles or depress the central nervous system (or both) and would limit a truck driver's ability to drive for extended periods.

Almost 13 percent of the tested drivers, and 37.5 percent of those who tested positive for drugs of abuse, had measurable amounts of alcohol in their systems. This finding is not unexpected: data from the National Highway Traffic Safety Administration's Fatal Accident Reporting System (FARS) for 1982-1985 indicate that 15 percent of fatally injured drivers of trucks weighing more than 10,000 lb GVWR had some alcohol in their systems.

Some drivers believe stimulants help reduce fatigue and enhance performance. Of the 56 drivers testing positive for drugs of abuse, 19, or 28.8 percent, showed use of stimulants.

Marijuana was identified in 21 of the fatally injured drivers.

### **Polydrug Use**

Of the 56 positive drivers, 23, or 41 percent, were polydrug users. In six of those cases, the driver tested positive for at least three drugs of abuse. In eight cases, alcohol was one of the drugs of abuse. The average blood alcohol concentration of the alcohol-polydrug user group was 0.13 percent.

### **Drug Use by Region**

As for the type of drug used and location of the accident, alcohol and marijuana were found in drivers fairly well distributed across the states. The cocaine cases were found primarily in California and Maryland. As a percentage of total tests or total drug-of-abuse-positive cases, Maryland is significantly higher for cocaine. For amphetamines, virtually all such fatal accidents in the study occurred in California.

### **Drug Use by Age**

Older drivers were less likely to test positive for drugs of abuse. The average age of all the fatally injured drivers was 42.4 years. The average age of the drug-free truck drivers was 44.6 years. The average age for drivers testing positive for drugs of abuse was 36.5 years. The single-drug user whose drug of choice was alcohol was significantly older (42.5 years) than any of the single-drug users whose drug of choice was other than alcohol (34.7 years).

### **Drug Use and History of Drug Problems**

A prior record of alcohol and drug abuse was strongly related to a positive test for drugs of abuse among the fatally injured drivers. Of the drivers who had a history of problems, 82 percent tested positive for drugs of abuse.

### **Multiple Licenses**

Drivers with at least one suspended or revoked license were more likely to have tested positive for drugs of abuse. Drivers with no known suspended or revoked licenses tested positive for drugs of abuse in 30.2 percent of the cases, whereas 57.9 percent of those with suspended or revoked licenses tested positive.

### **Medical Condition**

Nineteen of the 185 drivers (10 percent) had such severe health problems that health was a major factor in or the probable cause of the accident. Seventeen of those 19 accidents involved a form of cardiac incident.

### **Drug Use and Accident Causation**

In 49 (87.5 percent) of the 56 cases in which the drivers tested positive for drugs of abuse, impairment from using the drug or combination of drugs was a factor in causing the accident.

### **Fatigue and Drug Use**

Professional drivers made up nearly 81 percent of the fatally injured drivers in the study. On the basis of an analysis of the probable causes of the accidents, professional drivers were involved in 87.2 percent of the fatigue-related accidents and 95.4 percent of the fatigue- and drug-related accidents.

Fatigue and drug use are closely linked. More than half of the drivers who violated federal guidelines for hours of service tested positive for a drug of abuse. This was significantly higher than the drug use found for drivers who did not drive more hours than prescribed by the guidelines. The most prevalent drug of abuse among the drivers in violation was marijuana. Differences were also suggested for the stimulants amphetamine, methamphetamine, and cocaine. There appeared to be no difference between these groups in alcohol or multiple-drug use. Use of amphetamines and methamphetamines was disproportionately high not only among drivers in violation of hours-of-service guidelines, but also among drivers involved in accidents between midnight and 6:00 a.m. and especially among drivers who veered off the road or collided with other vehicles in ways that suggested dozing at the wheel. It is not surprising to find these drugs associated with fatigue-related accidents. Some drivers perceive that some drugs help to extend the amount of time they can drive without extended rest. These drivers do not realize that fatigue is aggravated when the initial effects of stimulants wear off. Sleep deprivation becomes a deficit that drugs cannot overcome. Depressants, such as alcohol, aggravate and reduce the initial effects of stimulants.

## CONCLUSIONS

The findings of the NTSB study will be useful in identifying the magnitude, scope, and characteristics of drug and alcohol use among drivers of heavy trucks. In addition, the problems of fatigue and medical conditions were identified. These data will help government and industry in their efforts to develop and implement programs to reduce these problems.

For a copy of the complete study report—*Safety Study—Fatigue, Alcohol, Other Drugs and Medical Factors in Fatal-to-the-Driver Heavy Truck Crashes*, PB 90917002, NTSB/SS-90/01—contact Barry M. Sweedler at (202) 382-6810 or fax the request to (202) 382-8006.

## DRUG EVALUATION AND CLASSIFICATION PROGRAM

Lt. J. C. Grant

Arizona Department of Public Safety

I will not dwell today on the statistics associated with the hazards presented by the drug-impaired driver. Other speakers have very forcefully shown that the drug-impaired driver is, and should be, a very real concern to the traffic safety community. The cost in lives lost, injuries sustained, and economic impact is staggering. I will, however, offer one statistic that I feel is of importance: the National Highway Traffic Safety Administration (NHTSA), in its report to Congress entitled *Use of Controlled Substances and Highway Safety* (1988), disclosed that between 14 and 50 percent of impaired drivers detained by police showed some indication of drug involvement.

The dilemma faced by law enforcement officers is familiar: a driver is stopped and arrested on suspicion of alcohol-impaired driving, and a breath test is administered that indicates that the subject's blood alcohol is substantially below the level required to prove intoxication. At this point, the officer has several alternatives:

1. The officer can pursue charges of driving under the influence (DUI) against the suspect, placing the burden on the prosecutor to prove impairment. It is unlikely that the prosecutor will pursue the case because of a lack of evidence to prove the cause of impairment.
2. If local laws permit, the officer can request the suspect to submit to a blood or urine test to determine the presence of drugs. The expense of toxicological

testing precludes many agencies from testing for a wide range of possible drugs that may be present; and, if drugs are confirmed in the sample, the burden of proving that these drugs—and not some medical or other defect—are indeed the reason for the impairment still rests with the officer.

3. The officer can cite the suspect for a lesser offense, thus allowing the suspect to "skate" on the more serious offense of DUI drugs.

In the late 1970s, officers of the Los Angeles Police Department, recognizing the problem created by the drug-impaired driver, pioneered the development of a drug-recognition procedure. This procedure allowed a trained officer to examine an impaired suspect and obtain compelling evidence that impairment was consistent with ingestion of a certain type or category of drugs.

In 1984, NHTSA, in cooperation with the National Institute on Drug Abuse (NIDA), sponsored a controlled laboratory evaluation of the drug evaluation and classification (DEC) process. The evaluation showed that drug recognition experts (DREs) were able to classify 98.7 percent of high-dose subjects as impaired and identify the category of drugs for 91.7 percent of the high-dose subjects. This study was followed by a NHTSA-sponsored field validation, the results of which demonstrated that trained DREs were able to identify the presence of certain categories of drugs in a majority of cases. In fact, the study found that

- When DREs predicted the presence of drugs other than alcohol, the drugs were detected in 94 percent of the cases;
- When DREs identified a suspect as being impaired by a specific drug category, the drug category was detected in the suspect's blood 79 percent of the time; and
- Only 3.7 percent of the suspects who had used drugs had blood alcohol concentrations (BACs) equal to or greater than 0.10 percent. It is likely that most, if not all, of the remaining suspects would have been released if the DREs had not recognized the drug symptoms.

After these studies, NHTSA developed a standardized curriculum for training officers as drug recognition technicians and in 1987 initiated pilot programs in Arizona, Colorado, New York, and Virginia. As of this time, the Drug Evaluation and Classification Program has expanded to 16 states and the District of Columbia.