The DEC process is a standardized and systematic means of examining an impaired subject to determine (a) whether the suspect is impaired, (b) if so, whether the impairment is drug-related or medically related, and (c) if it is drug-related, the broad category (or categories) of drugs most likely to have caused the impairment.

The DEC process is a postarrest procedure that takes place in a controlled environment such as a police station or jail facility. The process is not a way to determine the exact drug a person has taken; instead, it allows the presence of drugs to be narrowed down to broad categories of drugs that have similar symptoms. The process is not a substitute for a chemical test. Although a DRT can testify that there is impairment and that certain types of impairment may be consistent with certain categories of drugs, scientific corroboration of this testimony is still highly desirable.

For purposes of the Drug Evaluation and Classification Program, a drug is defined as "any chemical substance, natural or synthetic which, when taken into the human body, can impair the ability of the person to operate a motor vehicle safely."

Seven broad categories of drugs can be identified through the DEC process. These categories are based on the observable symptoms produced by the drugs rather than on medical or pharmacological qualities. The categories are central nervous system depressants, central nervous system stimulants, hallucinogens, phencyclidines, narcotic analgesics, inhalants, and cannabis.

The drug evaluation process is standardized in that officers are taught to perform the evaluation in exactly the same manner each time for every suspect. No steps are to be left out of the process, and none are to be added. The process is systematic in that it is based on a variety of observable signs and symptoms that are known to be reliable indicators of drug impairment. A DRT's conclusion is based on the totality of facts and indicators observed, never on a single clue or element of the examination. These facts are obtained from careful observation of the suspect's appearance, behavior, performance on psychophysical tests, eyes, and vital signs. The drug evaluation consists of a 12-step process, and each step is performed in a prescribed sequence and manner.

It is often asked whether it would be much simpler to obtain a blood or urine sample from persons who are impaired but whose BACs do not account for the level of impairment. This approach appears reasonable, but it often does not result in successful prosecution of DUI drugs cases. There are several reasons for this.

1. Often courts require that there be probable cause, or at least articulable suspicion, that drugs are the cause of impairment. The mere absence of alcohol as a causative factor may not be so construed.
2. Conducting tests for the presence of a full range of drugs, even if the search is limited to those most commonly abused, is costly and time-consuming. Add to this the fact that many substances abused by drivers are not routinely tested for in drug-screening processes, and you quickly realize the value of the DRT in helping to direct the laboratory technicians toward likely causes of impairment.
3. At this time, there is no means by which we can assume that a certain concentration of a drug in the blood or urine of a subject will cause a given level of impairment. Even more complex is the situation caused when several types of drug are taken or when drugs are taken in combination with alcohol, as frequently happens with drug abusers.

For these reasons and many others, it is essential that the arresting officer, the DRT, and the toxicologist form a partnership in arresting, prosecuting, and convicting the drug-impaired driver. Each has an essential role, and the absence of any one greatly reduces the effectiveness of the others.

Any questions about the Drug Evaluation and Classification Program may be directed to J. Michael Sheehan, Chief, Police Traffic Services Division, NHTSA, 400 Seventh Street S.W., Room 5119, Washington, D.C. 20590.

ALCOHOL AND OTHER DRUG INVOLVEMENT IN SERIOUS TRAFFIC CRASHES: DEVELOPMENT OF A RESEARCH PROTOCOL

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SUMMARY

Difficulties were encountered with project implementation, mostly on the issue of patient confidentiality, but they appear to have been sufficiently overcome (at the cost of delays) to permit a broader use of the proposed protocol. Two projects produced two results. First, methodology has been proposed and tested to permit researchers to more closely examine the roles of alcohol and drugs in nonfatal traffic crashes and the accuracy of police reporting of such involvement.

Second, the results of the pilot implementation indicate that drug involvement is possibly greater than previously suggested and that police underreport alcohol involvement and substantially underreport drug involvement in such crashes.

INTRODUCTION

This paper describes the conducting of a study on alcohol and drug involvement in traffic crashes. The research objectives are fairly simple, but developing research protocols and getting the study operational in the field were complex and time-consuming. An interim summary of study results is also included; a more detailed examination of the study's results will be presented in the future. A more detailed description of the implementation process is available from the author.

BACKGROUND

Problems associated with driving under the influence (DUI) are well known, but most studies have focused only on alcohol as the impairing substance, and the most commonly quoted DUI statistics are based on fatal-crash studies. The purpose of this study was to assist in filling gaps in the state of knowledge.

State of Knowledge

Alcohol-Involved Crashes

The popular press often quotes the statistic that "half of all traffic fatalities are *caused* by impaired (or 'drunk') drivers." There is some truth in that statement, but it is often taken well out of context. Many studies have shown that roughly 50 percent of drivers killed in traffic crashes have an impairing quantity of alcohol in their systems (Perrine, 1971; Fell, 1983). These studies do not, however, examine the "causes" of the fatal crashes. The involvement of an intoxicated motorist in the crash does not mean that alcohol was a crash factor. The percentage of fatal crashes caused by an intoxicated driver for which the intoxication was a factor in the crash is not well established.

The role of alcohol-impaired drivers in injury crashes is even less well known. Although complete toxicology examinations are often done on fatally injured drivers, the only time that alcohol or drug testing is done in nonfatal crashes is when a police officer requests it. The advent of the National Accident Sampling System (NASS) in the late 1970s provided a partial solution to this problem, although the data are still dependent on impairment detection by police officers. An examination of the NASS data indicated that 18–25 percent of injury crashes were alcohol-related (Fell, 1982). Earlier studies provided broadly similar (although generally lower) results (Borkenstein, 1964 and 1974; Farris, 1977; Treat, 1979).

Drug-Involved Crashes

The literature does contain studies of alcohol involvement in fatal and nonfatal crashes, but few are concerned with the involvement of other drugs. Again, most of the studies on drug involvement have focused on fatal crashes (Cimbura, 1982; Mason, 1984; Williams, 1985).

Two large-scale studies have been done on drug involvement in injury crashes (Terhune, 1981; Soderstrom, 1988). Both studied patients admitted to hospital emergency departments after crashes. Because Terhune needed informed consent from his test subjects, he lost about a quarter of his potential subjects. Soderstrom, who did not have a significant loss in population, tested only for cannabis and alcohol.

Police Reporting of Alcohol and Drug Involvement

Only one study has been found that compares police reporting of impairment to laboratory test results on the same drivers (Pendleton, 1986). It looked at fatal crashes in Texas and found substantial police underreporting of alcohol involvement.

Limitations of Studies

Most of the literature in this field relies on data from studies of fatal crashes, which can provide misleading information. First, for drugs other than alcohol, there is little agreement about what concentrations will affect driving performance. Second, many drugs can be detected in the system after they are no longer psychoactive. Third, if the victim dies more than a few hours after the crash, tests are suspect because of metabolism and hospital therapy. Finally, use of drugs other than alcohol also may not be accurately reported, because in many states the applicable law requires that tests be conducted only to determine the presence of alcohol.

Testing for the presence of drugs in nonfatally injured drivers is even more difficult. Police infrequently make arrests for driving under the influence of drugs because it is not an easy charge to prove. The courts have held that if impairment can be shown and if alcohol can be eliminated as the intoxicating agent (e.g., through a breath test), it is reasonable to assume that the

impairment is due to drugs. In practice, however, if a low result is obtained from the breath test, the suspect is often released by the police even if there is other physical evidence of impairment.

Studies by Fell (1986) and Burns (1987) have indicated that for every five drivers killed in traffic crashes who have more than the legal concentration of alcohol in their systems, about one has other impairing drugs. The ratio of arrests for DUI of alcohol to arrests for DUI of drugs is more than a magnitude greater than 5 to 1.

CURRENT RESEARCH EFFORT

This study will produce information in several areas. The three general research questions follow.

1. **What percentage of drivers injured in traffic crashes have alcohol, drugs, or both, in their systems?**

As discussed earlier, little information is currently available on impairment levels of drivers involved in nonfatal crashes, particularly if the impairment is caused by a substance other than alcohol.

2. **Are there variations by population subgroups in alcohol or drug involvement?**

Specific variables to be addressed for this question include driver age and gender, impairing substance(s) found, and time of and number of vehicles in the crash.

3. **How accurate are the police in detecting alcohol or drug presence in drivers injured in crashes?**

Studies indicate that police officers fail to identify the majority of alcohol-impaired drivers with whom they have face-to-face contact (Zusman, 1979; Vingilis, 1982). These studies are based on routine traffic stops. The additional turmoil of a crash scene can further affect a police officer's ability to detect an impaired driver.

DEVELOPMENT OF RESEARCH PROTOCOLS

Initial Protocol Development

It was initially hoped that data collection could be carried out as follows: urine specimens would be collected from all drivers injured in traffic crashes who are immediately treated in a hospital emergency department, and emergency department personnel would fill out a brief form that provides basic patient demographics. The urine samples would then be transported to a toxicology laboratory for analysis. The results of the toxicological analysis would be reported to the project team using a unique control number. The information from the laboratory reports would be combined with the data from the hospital and analyzed by members of the project team. Finally, these results would be compared with police reports of the accident.

The police report can be obtained with information from the hospital. To protect patient confidentiality, all personal identifiers would be removed from the report before laboratory information was added to the file.

Difficulties were encountered in getting the proposed protocol accepted, first through the university's institutional review board (IRB) and later at candidate hospital sites. The study concept was supported, but there were concerns about compromising patient confidentiality. The IRB concerns were resolved through the application for and receipt of a U.S. Department of Health and Human Services Certificate of Confidentiality, which makes the project data immune from all subpoenas.

The hospitals were concerned about the release of patient names under any circumstances. The names were not needed for study purposes per se but for obtaining police accident reports. Because the names would not be released, it would not be possible to match the laboratory reports to a specific accident report. As an alternative, it was decided simply to match the class of laboratory reports to the class of accident reports for which an injured driver was taken to a participating hospital. Analyses would then be done on the matching demographic subgroups in the two classes.

Analysis of Police Reports

The accuracy of police reporting of alcohol and drug impairment of drivers is analyzed by reviewing police accident reports. Two types of information were checked on this report. The first was whether an arrest was made for DUI. The second comes from a set of items on the back of the report form. Under "Apparent Physical Condition," an officer can mark "Normal," "Medicated," "Other" (with a blank to fill in), "Had Been Drinking," or "Unknown." There are also places to mark if a chemical test was offered, test type, test results, and whether the driver was tested for drugs other than alcohol.

If a DUI arrest was made, or if any of the impairment-related items on the back of the report form were marked, it would be assumed that the officer had detected the presence of an impairing substance. The lack of an arrest or lack of marks in those boxes would imply that no such detection was made.

Pilot Implementation Interim Results

Samples were collected from about 200 individuals at a pilot test hospital for 1 year. A complete analysis of the data is under way, but preliminary results are available as follows:

- 54 percent of all drivers in the sample had drugs, alcohol, or both in their systems;
- Evidence of impairing drugs (other than alcohol) was found in 32 percent of the driver sample;
- Evidence of alcohol (ethanol) was found in 42 percent of the sample;
- 79 percent of the drivers 25–34 years old had alcohol, drugs, or both in their systems;
- None of the drivers involved in crashes between 8 a.m. and noon had any impairing substances in their systems;
- 67 percent of the drivers involved in crashes between 12 p.m. and 8 a.m. had impairing substances in their systems;
- 72 percent of the drivers in single-vehicle crashes had impairing substances in their systems; and
- None of the police reports contained a reference to an officer's suspicion that a driver was under the influence of drugs, and fewer than five mention alcohol.

PROJECT STATUS AT OTHER HOSPITALS

After the pilot study was well under way, it was decided to implement the project in other hospitals. Implementing the project in other hospitals has been much slower than anticipated. As of mid-1989, specimen collection had been initiated at three additional hospitals and was continuing at two of them.

GUIDELINES FOR PROJECT IMPLEMENTATION AT OTHER SITES

If projects similar to this were to be initiated in other areas, it is recommended that the tasks as described below be followed to facilitate project implementation.

Task 1: Establish Procedures and Protocols

Before the final selection of hospitals, procedures for specimen analysis must be established and an experienced toxicology laboratory identified. One lab should do all testing for an entire region. Costs of various analyses should be examined because they can vary substantially among laboratories. Deciding not to test for substances rarely found in vehicle drivers can also reduce analysis costs.

A general protocol for conducting tests in hospitals should be developed (a sample is available from the author upon request). If the research is being conducted by most research institutions or the federal government, some type of protocol approval by a human subjects testing review panel is usually required. For the protection of all parties, obtaining a Certificate of Confidentiality from the U.S. Department of Health and Human Services is recommended.

Task 2: Obtain Hospital Cooperation

Candidate hospitals must be sought to participate in the project. The candidate hospital must demonstrate to the research team willingness to obtain the necessary specimens from all eligible drivers and to provide complete demographic data in a timely manner at a reasonable cost.

It is difficult to suggest specific guidelines on hospital type. When initiating a project in an area, the willingness of the hospital to participate (or the willingness of someone within the hospital to advocate participation) is the key factor. Another important factor is the number of potential test subjects admitted to the hospital's emergency department.

Because emergency-department personnel (usually the nursing staff) will do the actual project "work," cooperation and, preferably, project direction from department management is helpful. It is important that the hospital staff realize the potential value of the study, both nationally and locally. Participation can be sought for any or all of the following reasons:

- Public health will be benefited as the extent of the involvement of drugs and alcohol in traffic crashes is better identified;
- The health profession could be made more aware of the possible drug involvement of crash victims that they are treating;
- The study could be carried out without cost to the hospital (if adequate project funding is available);
- The hospital could enhance its professional standing by participating in such research; and
- Some data could be made available to the hospital staff for use in their own research efforts.

It is difficult to initiate research of this type within a limited time. It can sometimes take more than a year for the approval to work through the hospital administration.

It is also important to monitor test-site hospitals. Even if staff members receive training on their roles in the project, some will initially forget to collect or store samples. Providing hospital staff with project updates and interim results is also recommended for keeping interest (and necessary participation) at a high level.

Task 3: Obtain Cooperation of Law Enforcement Agencies

Besides identifying a laboratory and hospitals, seeking the cooperation of law enforcement agencies is necessary to permit the assessment of police reporting practices. Ideally, all that is wanted from them are copies of reports of accidents in which an injured driver was taken to a participating hospital. It may not be easy for some law enforcement agencies to provide reports that meet those criteria. Decisions must then be made about omitting that agency or asking (and possibly paying) for a larger set of reports, discarding those that do not meet the criteria.

Task 4: Collect Data

After all agreements have been completed with the hospital, police, and any other parties, actual data collection can begin. Primary data collection will be made by the hospital and law enforcement agencies. Collection from the hospital must be continuous, but the police data should be collected only once, after hospital collection is finished.

Task 5: Interpret Data

After the data have been collected, summaries similar to the following should be prepared:

- The percentage of drivers involved in serious-injury and fatal crashes who have evidence of drug or alcohol in their systems, cross-tabulated by such variables as driver demographics, crash time, and quantity and type of drug or alcohol; and
- A comparison of hospital-supplied data with data from police accident reports.

DRUG INVOLVEMENT AMONG DRIVERS ADMITTED TO A REGIONAL TRAUMA CENTER

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TRAUMA AS DISEASE

A 1966 National Research Council document entitled *Accidental Death and Disability: The Neglected Disease of Modern Society* identified trauma as a major health-care concern in the United States. In that report, trauma was recognized as the "leading cause of death in the first half of life's span" (*1*). A 1985 follow-up report, *Injury in America: A Continuing Public Health Problem*, indicated that injury had become the leading cause of death for Americans between the ages of 1 and 44 (*2*). In 1985, 143,000 people suffered injury-related deaths, making injury the fourth-leading cause of mortality in the United States. Overall, approximately 60 million people required treatment and 2.3 million required hospitalization for their injuries. The estimated aggregate lifetime financial burden incurred by those injured in 1985 is $158 billion (*3*).

From 1985 through 1987, the years of potential life lost due to injury exceeded those from the leading causes of death—heart disease and cancer—combined (*4,5*). Whitfield and colleagues (*6*) predicted that 8 million people alive in 1980 will eventually die as the result of injuries, including 5.3 million men. Two million people are expected to die from traffic crashes: half of the predicted 1.4 million men will die by age 35, and half of the predicted 600,000 women will die by age 40.

TRAUMA CENTERS IN THE UNITED STATES

The "*Accidental Death and Disability*" document provided the impetus for the creation of trauma centers throughout the United States. In 1985 there were approximately 350 trauma centers of various levels; by the end of 1990 there were more than 500.

The Shock Trauma Center of the Maryland Institute for Emergency Medical Services Systems (MIEMSS) of the University of Maryland in Baltimore is a Level I trauma center. Trauma centers have been characterized by the Committee on Trauma (COT) of the American College of Surgeons (ACS) as Levels I, II, and III on the