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***Drinking and Driving***

Driving involves multiple tasks, the demands of which can change continually. To drive safely, one must maintain alertness, make decisions based on ever-changing information present in the environment, and execute maneuvers based on these decisions. Drinking alcohol impairs a wide range of skills necessary for carrying out these tasks. This *Alcohol Alert* examines alcohol impairment of driving skills and describes some factors that increase motor vehicle crash risk.

***Some Factors That Influence Crash Risk***

**Blood alcohol concentration.** The proportion of alcohol to blood in the body is expressed as the blood alcohol concentration (BAC). In the field of traffic safety, BAC is expressed as the percentage of alcohol in deciliters of blood--for example, 0.10 percent (i.e., 0.10 grams per deciliter). A 160-pound man will have a BAC of approximately 0.04 percent 1 hour after consuming two 12-ounce beers or two other standard drinks on an empty stomach (1).

All State laws stipulate driver BAC limits, which now vary by State. According to these laws, operating a vehicle while having a BAC over the given limit is illegal (2). The BAC limit for drivers age 21 and older in most States is 0.10 percent, although some States have reduced the limit to 0.08 percent.

The many skills involved in driving are not all impaired at the same BAC's (3). For example, a driver's ability to divide attention between two or more sources of visual information can be impaired by BAC's of 0.02 percent or lower (3-5). However, it is not until BAC's of 0.05 percent or more are reached that impairment occurs consistently in eye movements, glare resistance, visual perception, reaction time, certain types of steering tasks, information processing, and other aspects of psychomotor performance (3,4,6,7).

Research has documented that the risk of a motor vehicle crash increases as BAC increases (3,4,8) and that the more demanding the driving task, the greater the impairment caused by low doses of alcohol (3). Compared with drivers who have not consumed alcohol, the risk of a single-vehicle fatal crash for drivers with BAC's between 0.02 and 0.04 percent is estimated to be 1.4 times higher; for those with BAC's between 0.05 and 0.09 percent, 11.1 times higher; for drivers with BAC's between 0.10 and 0.14 percent, 48 times higher; and for those with BAC's at or above 0.15 percent, the risk is estimated to be 380 times higher (8).

**Youth.** Youthful age has been cited as one of the most important variables related to crash risk (9). Young drivers are inexperienced not only in driving but in drinking and in combining the two activities (9). In 1994, almost 7,800 persons ages 16 through 20 were drivers in fatal motor vehicle crashes (10). Twenty-three percent of these drivers, for whom drinking any quantity of alcohol is illegal, had BAC's of 0.01 percent or higher, compared with 26 percent of drivers age 21 and older (10).

According to Hingson and colleagues, each 0.02-percent increase in BAC above 0.00 percent places 16-to 20-year-old drivers at greater risk for a crash than older drivers (11). Roadside surveys indicate that young people are less likely than adults to drive after drinking; however, especially at low and moderate BAC's, their crash rates are substantially higher than those of other groups (9).

Driving inexperience and immaturity are considered to be the main causes of motor vehicle crashes among drivers ages 16 to 20, even when alcohol is not involved (9). In one study, Hingson and colleagues concluded that drivers in this age group have a greater risk than older drivers of being involved in a fatal crash even with a BAC of 0.00 percent (11). Young people's lack of driving experience renders them less likely than more experienced drivers to cope successfully with hazardous situations (9). This, combined with a penchant for risk-taking driving behavior such as speeding--along with a tendency both to underestimate the dangerous consequences of such behaviors and to overestimate their driving skill--contributes to the high crash rate among young drivers (12,13).

**Gender.** Twenty-nine percent of male drivers involved in fatal motor vehicle crashes had BAC's of 0.01 percent or greater, compared with 15 percent of female drivers (10). However, studies indicate that at BAC's ranging from 0.05 to 0.09 percent, crash risk may be greater for females than for males (8,14). Research shows that women metabolize alcohol differently from men, causing women to reach higher BAC's at the same doses (4,15). However, laboratory studies of alcohol impairment of driving skills among women are rare and the results are inconclusive (6).

**Combining medications with alcohol and driving.** Combining certain medications with alcohol increases crash risk. Sedatives and tranquilizers alone can impair driving skills (16) and can impair them even more when combined with alcohol (17-20). For example, low doses of flurazepam, a sedative-hypnotic prescribed for the treatment of insomnia, alone can impair a driver's ability to steer. The effect of this medication can be compounded with even a small dose of alcohol consumed the next morning (20). Driving skills can be impaired by other medications, such as codeine, as prescribed to treat moderately severe pain (20). When combined with alcohol, such medications' adverse effects on driving skills are exacerbated, as are the effects of some antidepressants, most antihistamines, certain cardiovascular medications, and some antipsychotic medications (20).

**Alcohol tolerance.** The repeated performance of a particular task in association with alcohol consumption can lead to the development of a form of adaptation referred to as "learned" or "behavioral" tolerance (21). Learned tolerance can reduce the alcohol-induced impairment that would ordinarily accompany the performance of that particular task (21). However, when conditions change or when something unexpected occurs, the tolerance acquired for that task can be negated (22).

These findings may be applicable to the performance of tasks involved in drinking and driving (21,23). A driver who has developed behavioral tolerance to driving a familiar car over a particular route under routine circumstances may drive without being involved in a crash, despite consumption of some alcohol (21,23). However, when encountering a novel environment--for example, a detour--or an unexpected situation, such as a bicycle darting in front of the car, this same driver would be at the same risk for a crash as a novice driver at the same BAC, due to lack of prior learning opportunities for these unexpected events.

### ***Legal Sanctions for DUI Offenders***

Legal sanctions, such as driver's license suspension and court-ordered alcoholism treatment, are designed to deter drinking and driving (24). Driver's license suspension and license revocation seem to be the most effective deterrents among the general driving population (24). However, a meta-analysis of deterrent

strategies targeted to the drinking-and-driving population concluded that the most effective means for reducing rearrest for driving under the influence of alcohol (DUI) and crashes was a combination of license suspension and interventions such as education, psychotherapy/counseling, and some followup (25).

Researchers contend that court-ordered treatment should be considered an adjunct, not an alternative, to license sanctions (24). According to Sadler and colleagues, a DUI conviction should serve to identify problem drinkers and guide or coerce them into alcohol treatment (26). Alcohol treatment for DUI offenders can range from short-term educational sessions to therapy programs lasting at least 1 year (24).

Treatment of convicted drinking drivers normally emphasizes modifying drinking behavior (24). The type and duration of treatment depend on factors such as the severity of the person's drinking problem and DUI history (24,27). DUI offenders with less severe drinking problems benefit most from educational programs (24,27), although no known model is thought to be most effective (24) in reducing recidivism or alcohol-related crashes. For repeat offenders or those with more severe drinking problems, therapy that lasts for at least 12 months (24) and that includes intensive programs focused on the individual appears to be most effective (27).

### ***Prevention***

The National Highway Traffic Safety Administration (NHTSA) credits State laws raising the legal drinking age to 21 with preventing almost 1,000 traffic deaths annually (11). Legislation to reduce the BAC limit to 0.02 percent or lower, referred to as the "zero tolerance law" for young drivers, has been passed by 29 States and the District of Columbia to reduce alcohol-related fatalities further (10,11). The National Highway Systems Act provides incentives for all States to reduce their BAC limits for drivers under 21 to 0.02 percent beginning October 1, 1998.

One study (11) examined the effectiveness of lowering BAC limits for young people in States where such laws have been in force for at least 1 year. The researchers found that after the BAC limits were lowered to 0.00 or 0.02 percent, the proportion of nighttime fatal crashes involving single vehicles in this age group dropped 16 percent.

# Drinking and Driving

The World Health Organisation's European Charter on Alcohol states that Governments should:

“Establish and enforce laws that effectively discourage drink-driving.”

The WHO Charter has been signed by the Member States of the European Union, including the UK.

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## Introduction

Since the early 1980s, there has been a substantial decline in drinking and driving and in the number of alcohol-related deaths and injuries on the roads. However, drinking and driving remains one of the main causes of death and injury, and in recent years the decline in the number of casualties has come to a halt.

In 1997 there were an estimated 540 deaths and over 16,000 injuries involving illegal blood alcohol levels. Around half of the casualties were to people other than the drinking drivers themselves. (1)

There were probably an additional 250 people killed in accidents involving drivers and

riders with raised blood alcohol levels but still below the current legal limit. (2)

Altogether, therefore, around one in five road deaths are alcohol related.

### **In What Ways Does Alcohol Affect Driving Skills?**

After drinking, the brain works inefficiently, taking longer to receive messages from the eye; processing information becomes more difficult and instructions to the muscles are delayed. Alcohol can slow down reaction time by 10 to 30 per cent. It also reduces ability to perform two or more tasks at the same time.

Alcohol reduces the ability to see distant objects and night vision can be reduced by 25 per cent. Blurred and double vision can also occur. Ability to perceive what is happening at the roadside is weakened. Loss of peripheral vision could be crucial.

Alcohol may also create a sense of overconfidence, with the result that people are prepared to take greater risks.

Even when sober, young drivers and riders are more accident prone than older, more experienced drivers. Their lower tolerance to alcohol further increases their accident risk. The vulnerability of a young person to the effects of alcohol is shown by the lower average blood alcohol levels of young drink driving offenders compared with older offenders. The same pattern is found in drivers who are killed. For young people accident risk increases after one drink; after two it doubles and after five it can have increased ten fold.

### **The Legal Limit for Driving**

The legal blood alcohol limit for driving is 80 milligrammes of alcohol in 100 millilitres of blood (80mg%) equivalent to 35 microgrammes of alcohol in 100 millilitres of breath, or 107 milligrammes of alcohol in 100 millilitres of urine. No other country in the EU has a higher limit than this, and in some it is lower. Before its election and again in February 1998 the UK Government announced that it intended to reduce the legal limit to 50mg% and a consultation exercise took place. However, press reports suggest that the Government is having second thoughts about the measure.

[Sections from “Who are drink drivers” to “Non-legal Penalties” not included]

## **High Risk Offenders**

Also introduced in 1991 was the 'High Risk Offender' (HRO) scheme. This is intended to manage convicted drink-drivers who may have a drinking problem. After their period of disqualification, high risk offenders' licences are returned only if they can convince the court that they do not have or have overcome a drink problem. High Risk Offenders are drivers who:

- Have been found to be over 2 1/2 times the legal limit
- Have two convictions for drink driving at any blood alcohol level within a ten year period
- Have refused to provide a sample

Each year, between 30,000 - 40,000 offenders are classed as HROs.

## **Experimental Educational Programmes**

In 1993, an experimental scheme was set up by the Department of Transport to provide education/ rehabilitation courses for drink drive offenders in 22 areas of Great Britain. The courses, aimed primarily at first-time offenders, are voluntary and offenders have to pay the cost themselves, the maximum cost being set at 00. Offenders who complete the course are entitled to a 25 per cent reduction in their period of disqualification. This feature of the experimental courses was criticised by some road safety groups, motoring organisations and others for, in effect, allowing offenders in some parts of the country to buy a reduction in their sentence.

Independently of this experimental scheme, educational courses for drink drive offenders have been running for some years in various parts of Britain, often provided by Probation Departments and as a condition of a probation order.

## **Further Measures To Reduce Casualties**

### **A General Power to Breathalyse -**

The Police have asked for restrictions on their powers to breathtest drivers to be removed. This would help them to use their powers more effectively both as a deterrent and also to target drinking drivers who remain undeterred. There is ample evidence that high profile police breathtesting of drivers cuts casualty rates. (6)

## **A Lower Legal Limit -**

An argument frequently employed by the alcohol industry against lowering the limit is that such a step would not affect casualties as road deaths tend to be caused primarily by drivers with very high blood alcohol levels who would ignore a lower limit just as they ignore the present one. In fact, however, about the same number of people die in accidents associated with alcohol levels below the present limit as very high levels.

The Department of Transport estimates that reducing the legal limit to 50mg% could save 50 lives and prevent up to 1500 injuries each year. (4) However, this is a conservative estimate as it is calculated purely on the basis of the proportions of the injuries and fatalities caused by blood alcohol levels of between 50mg% and 80mg%. It therefore makes no allowance for the possibility that reducing the limit would also reduce the numbers of drivers at all blood alcohol levels including those with very high levels. This appears to have been the experience of the United States.

In Europe, reducing the limit to 50mg% in France (in 1995) is reported to have reduced fatalities by 4 per cent. In Belgium, where the limit was reduced to 50mg% in 1994, there was a 10 per cent decrease in fatalities in 1995 and a further reduction of 11 percent in 1996. (7)

In Germany, lowering the limit to 50mg% (in May 1998) resulted in a halving of the number of alcohol-related accidents in Cologne, where the number of drinkers caught with a level of 110mg% fell by 25%. (8)

### **References:**

- (1) Road Accidents Great Britain 1997. The Stationary Office 1998.
- (2) Hansard 26 January 1998. Written answers.
- (3) Department of Transport: Drink Driving Campaign 1997, A Clayton: Which way forward? The Portman Group 1997, and other sources.
- (4) Combating Drink Driving: Next Steps. A Consultation Paper. Department of the Environment, Transport and the Regions. February 1998.
- (5) Home Office Statistical Bulletins - Motoring Offences.
- (6) J Dunbar et al: Drinking and driving: success of random breath testing in Finland. British Medical Journal, 11 July 1987.
- (7) ICADTS Reporter Summer 1998.
- (8) Frankfurter Rundschau 5/9/98

**The case for a  
0.05 Blood  
Alcohol  
Concentration  
limit**

March 1990

## Overview

Drink driving is the most significant contributing factor to fatal road crashes in Australia. Its cost to the community in both human and economic terms is staggering.

In 1987, 38% of drivers and motorcyclists killed in road crashes had a Blood Alcohol Concentration (BAC) of 0.05 and over. This represents the loss of more than 500 lives.

Alcohol-related road crashes cost about \$1200 million per year.

These are conservative estimates, as alcohol-affected drivers may cause crashes but not be killed themselves.

The drink-driving problem requires the coordinated application of a number of counter-measures. The Prime Minister's road safety package includes measures aimed at reducing the extent of drink driving. Apart from the national 0.05 BAC level, the package requires zero BAC for young drivers in the first three years of driving, and a high level of random breath testing. In combination with other counter-measures, these will send a clear signal to the community that drinking and driving involves an unacceptably high level of risk.

As well as the strategic and general philosophical argument for the national adoption of a 0.05 BAC limit, there is an array of statistical, behavioural and medical evidence that also makes a particularly strong case for the move.

- ▶ A number of studies have shown that performance on driver-related tasks is significantly impaired at very low BAC levels (i.e. below 0.05). Even small amounts of alcohol have a measurable effect on skilled performance.
- ▶ Statistical analysis of accident risks for drinking drivers reveals that risk is relatively unchanged up to the 0.05 level and then increases steadily to the 0.08 level after which it increases rapidly. Put in more concrete terms, the risk of a crash at a BAC of 0.05 is twice that at zero, while at 0.08 BAC the risk is twice that at 0.05 and four times that at zero.
- ▶ The strongest evidence in support of a 0.05 limit comes from studies of an actual change in the legal limit from 0.08 to 0.05, which occurred in New South Wales in 1980 and in Queensland in 1982. These clearly show the introduction of the lower BAC legal limit reduced the number of alcohol-related crashes in both States. The lower BAC also realised significant financial savings in both States as a result of reduced accident costs. In NSW the savings were \$76 million, with \$32 million saved in Queensland.

A move to 0.05 is likely to affect drinking drivers in different ways. The most beneficial effect is likely to be through altering the behaviour of drivers who often drive with high BACs. Studies in NSW and Queensland have shown that a move to 0.05 reduces the number of drivers with high BACs. As these people constitute the major part of the drink-driving problem, reductions in crashes are inevitable.

As the incidence of crashes rises very sharply with BACs of 0.10 and above, it is essential to have a reasonable buffer between the legal limit and the level at which risk becomes much greater. A BAC limit of 0.08 does not afford this protection.

There is also an important health benefit element to the move to 0.05 BAC. The reduced BAC level would encourage people to moderate their drinking when driving, and it would also be consistent with efforts to discourage excessive drinking generally. A BAC of 0.05 fits well with the health concept of a safe drinking level of four standard drinks a day for men and two for women.

The evidence for a 0.05 BAC limit is compelling. Research indicates it will reduce the level of alcohol-related road trauma and suffering. It will also result in significant financial savings to the community with negligible implementation costs. The community is clearly in favour of such a move.

This paper has been prepared by the Federal Office of Road Safety in consultation with a range of road safety experts who are listed in Attachment: 1