THE LEGISLATION

On April 8, 1974 legislation was introduced by the Victorian State Government requiring blood samples to be taken from all people, 15 years of age and over, presenting at hospital casualty departments after road traffic accidents. The law was introduced primarily to enable blood alcohol levels of drivers to be determined. However, to ensure more efficient use of limited resources in casualty departments, it was decided to test all road traffic accident victims and later determine the road user category of patients.

When blood samples are taken (by the doctor responsible for the patient), they are divided into 3 parts. The first part of the sample is for the Police, the second for the patient and the third for medical staff and research workers.

The Police Sample

The portion of the sample meant for the Police is retained at the hospital and collected by the Police, if they wish to obtain evidence for a charge against a driver of exceeding the legal blood alcohol level (50 mg/100 ml in Victoria). The Police sample is held at the hospital and if not collected within 14 days is discarded.

Since the legislation has been operating, analyses of “Police” samples conducted at the Police Forensic Science Laboratory have provided evidence for approximately 1400 prosecutions of drinking drivers. Prosecutions presenting results of these analyses are invariably successful.

The Patient Sample

The second part of the sample is stored at the hospital and made available to the injured person, for private analysis if required, when charged with a drink/driving offence.

Medical/Research Sample

The third part of the original sample is used by medical staff and research workers. This sample is sent to a central testing laboratory where the blood alcohol concentration is determined. Although an accurate method of analysis is used, this is regarded as a screening test and results cannot be accepted as evidence in a court case. After analysis, results of testing are relayed back to the hospital where the sample was taken. A fairly rapid feedback system is available but normally the information takes up to 14 days to reach the hospital. These results can be used, if received quickly, for diagnosis and patient management (e.g. making decisions about the administration of anaesthetic, etc.). The information can also be used to detect problem drinkers and direct them into appropriate rehabilitation programs.

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aRoad Safety and Traffic Authority, Victoria, Australia.

bAlthough no changes have been made to this legislation since its introduction, regulations associated with the storage and analysis of samples are under review.
RESULTS AS DATA FOR SCIENTIFIC RESEARCH

Results of analyses of medical research samples are also forwarded to research organisations including the Road Safety and Traffic Authority (RoSTA), a section of the Victorian State Government involved in drink/driving countermeasure activities. The data obtained by RoSTA are coded and computer summaries of the results are produced. The information obtained is used by RoSTA in the planning and evaluation of measures designed to counter drinking and driving. These activities include publicity and evaluation of legislative measures.

THE ROLE OF ALCOHOL IN ROAD ACCIDENTS

A great deal of evidence, both from Australia and overseas, supports the view that drinking drivers are more likely to be involved in traffic accidents than drivers who have not been drinking, i.e. their involvement in traffic accidents is significantly higher than their proportion in the population of drivers. Many studies have been undertaken to determine the proportion of drinking drivers in the driving population. Research conducted in the Australian Capital Territory (A.C.T.) by Duncan in 1971/72 showed that only 1.1% of a random sample of drivers (stopped between 10 a.m. and 2 a.m.) had blood alcohol concentrations (B.A.C.) of 80 mg/100 ml or higher (80 mg/100 ml is the legal limit in the A.C.T.).

In Victoria, where the legal limit is 50 mg/100 ml, results of tests conducted at the “random” (preliminary) breath test stations of the Victoria Police show that approximately 2% of drivers have blood alcohol concentrations above the legal limit. Even though the tests conducted by Police at the “random” breath test station are not truly random, the figure of 2% of drivers above the legal limit probably represents a reasonable approximation to the situation on Victorian roads, during the period when the stations operate (4 p.m. to 2 a.m.).

Although no Australian study has fully investigated the involvement of drinking drivers in motor vehicle accidents, the “Grand Rapids” study conducted in the U.S.A. by Borkenstein et al. showed that 14.3% of drivers involved in traffic accidents (both minor and serious) had blood alcohol levels above 50 mg/100 ml. These data are probably similar to what would be found in comparable Australian research.

Another Australian study carried out by Hossack and Brown examined blood alcohol readings of 444 drivers killed in road accidents in Victoria between 1970 and 1973. They reported that 47.1% of this group had blood alcohol concentrations above 50 mg/100 ml.

VICTORIAN HOSPITAL BLOOD ALCOHOL DATA

The results of analyses of blood alcohol samples obtained from people entering hospitals in Victoria after motor car accidents have been compiled at the Victorian Road Safety and Traffic Authority. These results show that during the period October 1974 to November 1976, blood samples from 27,263 motor car accident victims were obtained and tested for their alcohol concentration. Of the total number, 22,879 (83.9%) were from drivers and 4,384 (16.1%) from non-drivers, i.e. passengers, pedestrians and cyclists.

Testing is not random as the units work at times and places where drinking drivers are likely to be encountered. However, the figure may be partly deflated because some drivers may be aware of the location of the stations and thus avoid being tested.

The figure for non-drivers is low because for over 12 months of the testing period there were not sufficient facilities for testing all samples; thus “non driver” samples were not analysed. Results of the analyses of non-driver samples were similar to those of drivers but showed a slightly lower proportion of positive readings and less high positive readings.
Of the 22,879 "driver" samples 5,954 (26.0%) had some detectable blood alcohol when tested. Of the drivers, at least 5,076 (22.2%) had B.A.C.'s of 50 mg/100 ml or above. Figure 1 shows the results of analyses of hospital blood alcohol samples compared with previous research concerning drinking drivers.

![Figure 1](chart.png)

Figure 1. Percentage of drivers with B.A.C.'s of at least 50 mg/100 ml in several studies of drinking and driving.

The results described above show that accident involved drivers are more likely to have elevated B.A.C.'s than those not involved in accidents. The figure also demonstrates that as accident severity increases the proportion of drivers involved who have B.A.C.'s above 50 mg/100 ml also increases.

Results of further analyses of "driver" samples are shown in Table 1. These results are compared with those obtained in a similar study (with a much smaller sample) conducted in New Zealand by Hart et al.4

<table>
<thead>
<tr>
<th>B.A.C. (mg/100 ml)</th>
<th>Victoria</th>
<th>New Zealand</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nil</td>
<td>16,925</td>
<td>74.0%</td>
</tr>
<tr>
<td>1 - 49</td>
<td>690</td>
<td>3.0%</td>
</tr>
<tr>
<td>50 - 99</td>
<td>1,038</td>
<td>4.5%</td>
</tr>
<tr>
<td>100 - 149</td>
<td>1,174</td>
<td>5.1%</td>
</tr>
<tr>
<td>150 - 199</td>
<td>1,036</td>
<td>4.5%</td>
</tr>
<tr>
<td>200 - 249</td>
<td>863</td>
<td>3.8%</td>
</tr>
<tr>
<td>250+</td>
<td>965</td>
<td>4.2%</td>
</tr>
<tr>
<td>Positive*</td>
<td>188</td>
<td>0.8%</td>
</tr>
<tr>
<td>N = 22,879</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* For technical reasons a small number of readings could not be accurately determined. They were classified only as "Positive".
OTHER CHARACTERISTICS OF INJURED DRIVERS

When a blood sample is taken from a road crash victim for blood alcohol analysis, it is forwarded to the testing laboratory with very little additional information. Only the name of the person, the date of testing, the name of the hospital and the road user category (driver or non-driver) are forwarded with the sample. From the names however, the sex of the patient can generally be determined. In the 2 year period October 1974 to September 1976, 25,936 samples were analysed. Of this number, 15,459 (59.6%) were from males, 7,236 from females but for 3,241 samples (12.5%) gender could not be determined. Disregarding samples for which gender could not be determined, 68.1% of the remainder were from males, and 31.9% from females.

Table II shows the results of hospital blood alcohol analyses by sex; it indicates that male road accident victims attending at hospitals were much more likely to have been drinking than were injured females.

Table II  Hospital B.A.C. by Sex

<table>
<thead>
<tr>
<th>B.A.C. (mg/100ml)</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>%</td>
<td>Frequency</td>
</tr>
<tr>
<td>Nil</td>
<td>10,320</td>
<td>66.8</td>
</tr>
<tr>
<td>1 - 49</td>
<td>584</td>
<td>3.8</td>
</tr>
<tr>
<td>50 - 99</td>
<td>897</td>
<td>5.8</td>
</tr>
<tr>
<td>100 - 149</td>
<td>1,033</td>
<td>6.7</td>
</tr>
<tr>
<td>150 - 199</td>
<td>924</td>
<td>6.0</td>
</tr>
<tr>
<td>200 - 249</td>
<td>726</td>
<td>4.7</td>
</tr>
<tr>
<td>250+</td>
<td>825</td>
<td>5.3</td>
</tr>
<tr>
<td>Positive</td>
<td>150</td>
<td>1.0</td>
</tr>
</tbody>
</table>

N = 15,459  N = 7,236

\[X^2 = 2369.5, 1 \text{ d.f.}, p << .01\]

These data show that 28.5% of male road users attending at hospital after accidents have B.A.C.'s of at least the legal limit (50 mg/100 ml), while 16% of males had B.A.C.'s at least 3 times the legal limit (i.e. 150 mg/100 ml). In comparison only 8.1% of women had B.A.C.'s equal to or higher than 50 mg/100 ml. This over-representation of males in the drink/driving population has often been demonstrated. A study of breathalysed drivers conducted by Raymond showed that most were male. Although they are under-represented in the drink/driving population, the contribution of women to this problem is not negligible and in fact may increase (relative to male involvement) as a consequence of social changes now taking place. In a study of drinking and driving carried out by Freedman, Henderson and Wood in New South Wales in 1971, it was found that 24.7% of women in the sample admitted having driven after drinking more than their "safe limit". As would be expected, the male figure was much higher (71.7%).

Of the hospital samples analysed between October 1974 and September 1976, 18,188 (70.1%) were from hospitals located in the Melbourne Metropolitan area (city) and the remainder, 7,734 (29.8%), were from hospitals in provincial cities/towns and rural areas (country). When the results from hospitals in Melbourne were compared with those from country hospitals, it was found that a significantly higher proportion of those people attending at country hospitals had B.A.C.'s at the legal limit or above. (At country hospitals the figure was 25.6% compared with 19.7% at city hospitals.) This finding is not related to any sex bias in the sample as the percentage of males presenting at country hospitals is almost identical to that in the city. This result may indicate that the drink/driving problem is relatively more serious in rural Victoria than in Melbourne.

\[X^2 = 2369.5, 1 \text{ d.f.}, p << .01\]
NEED FOR OTHER DATA

Unfortunately no other data are available to describe the characteristics of road crash casualties attending at hospital. Having additional information about the age and occupation of victims and some details about the accidents would be extremely valuable. A study by Salter and Ryan of the characteristics of road crash victims at one particular (city) hospital has found relationships between blood alcohol levels and sex (males were over-represented amongst those with high B.A.C.’s); age, (over-involvement of those between 20 and 30) and time of accident (night time accidents were over-represented). A further study is being planned (by the current author) to relate blood alcohol test results from a sample of road accident victims (from both city and country hospitals) and other biographic and accident information.

USE OF BLOOD ALCOHOL TEST RESULTS FOR COUNTERMEASURE EVALUATION

Apart from assisting in the analysis of the drink/driving problem, data resulting from the B.A.C. analyses of blood samples from injured road users are also used to measure the effectiveness of various drink/driving countermeasures.

At the present time Victoria has trial “random” breath test legislation. The law has been introduced, initially for 12 months, and allows certain designated Police, working at “random” breath test stations, to stop any motorist for a breath alcohol test. Results from hospital blood alcohol testing are being monitored as part of an evaluation of the effectiveness of the “random” breath test law in reducing the number of alcohol-involved accidents.

REFERENCES


Results of testing under this law have been quoted above.