A Review of Australian Research and Action on Alcohol and Traffic Safety

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INTRODUCTION

In this 7th International Conference on Alcohol, Drugs and Traffic Safety our major concern is with the problem of alcohol and road safety. Australia, in common with most other industrialised countries, has a steadily rising road toll of deaths and injuries involving drivers, passengers, motor cyclists and pedestrians.

The development of research in this field in Australia has been closely related to action. The first data obtained on blood alcohol levels in fatal traffic casualties was obtained in 1958 in Victoria by Bowden et al. This was followed by the introduction of the breathalyser on a voluntary basis in 1961, which then led to compulsory tests in 1962. Both Bowden et al and Birrell reported that about one-third of motor car drivers killed on the road had blood alcohol concentrations in the region of 100 mg%. This was a major factor leading to the Royal Commission into the Sale, Supply, Disposal and Consumption of Liquor in the State of Victoria (1964-65).20

The Report of the Royal Commissioner, Sir Philip Phillips, Q.C., was a landmark which made two important recommendations affecting road safety; that there be a change in the closing time of licensed premises from 6 p.m. to 10 p.m., and that a new offence be created making illegal the driving of a car with a blood alcohol level greater than 50 mg%. This level, lower than that adopted subsequently by all the other States of Australia (80 mg%) was adhered to by the Royal Commissioner and in retrospect most of us believe he was quite right. There is definite evidence of increased risk of accident at this level and personal experience with a breathalyser test soon indicates a level of 0.05 as being undesirable for driving.

The effect of the legislation was apparent soon after it became law in February, 1966. There was a striking shift in the time of occurrence of serious traffic accidents associated with the change in drinking hours but no change in the total number of crashes or deaths. There was, however, a fall in the blood alcohol concentration in breathalysed drivers after 1966 compared with before 1966.3 Convictions rose from 1218 in 1961 to 4178 in 1967 and 10,793 in 1972. The simple requirement for conviction of a blood alcohol level of 50 mg% in a driver within 2 hours of his apprehension has done away with the necessity of defining drunkenness, driving impairment or degree of intoxication. The legislation had led to a steady output of clinical and epidemiological data which has been of the greatest importance in further defining the alcohol and road safety problem, thus enabling additional steps to be taken in the 10 years since it became law.

In this paper I shall be primarily concerned with the link between research and action through a social process which requires better understanding if control of this lethal modern 'epidemic is to be achieved. The evolution of the breathalyser legislation and its subsequent off-shoots — the hospital compulsory blood alcohol legislation and the random test legislation — illustrate well the nature of this social process.

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A MODEL LINKING RESEARCH AND ACTION

This social process can be illustrated by a model representing the various components in the social process linking research and action. The model (Figure 1) shows a social process consisting of a series of steps — (1) the gathering of blood alcohol data, (2) its analysis and then (3) its dissemination through mass media leading to public discussion. Then a (4) plan emerges for a new step designed to meet the problem that has been to some extent defined by the data. This may require (5) political agreement before it can be realized and (6) legislation may be required, followed by implementation and (7) evaluation. Evaluation requires the collection of new data, which then goes through the cycle again.

**Figure 1**  
*Model demonstrating the social process linking research and action on alcohol and road safety.*

In the case of the breathalyser legislation, the initial findings of elevated blood alcohol levels in dead drivers (step 1) was a major factor that led to a full examination by the Royal Commission (steps 2, 3, 4). Political acceptance (step 5) led to legislation of a compulsory test for blood alcohol in drivers suspected of being under the influence of alcohol. The implementation of this legislation led to convictions and in due course to the availability of these drivers for rehabilitation and research study.

The breathalyser test has revealed evidence of the dimension of the problem of drinking and driving in Australia, as in other countries. But it has not led to any fall in crashes, mortality or injury from crashes (Figure 2). Our experience therefore is at variance with experience in the United Kingdom where an effect in reduction in crashes, fatalities and injuries could be demonstrated following passage of the breathalyser legislation in 1967. The transience of this effect in the United Kingdom raises important questions which will come up for further consideration later.

The ineffectiveness of the breathalyser legislation in reducing road deaths and injuries contrasts very much with the effectiveness of the compulsory seat belt legislation in Australia.
No effect is shown following passage of breathalyser legislation from 1966, but a striking effect is shown following the compulsory seat belt legislation from 1971.

(Figure 2). This legislation, in its first nine months in 1971, was shown to be associated with a fall of 17.7% in road deaths and 14.8% in injuries in the State of Victoria compared to the rest of Australia (Table I). This led to rapid adoption of the legislation by the other States of Australia and more recently to adoption by other countries (e.g., Belgium, Holland, France (outside Paris), Switzerland, Sweden and New Zealand). There has been a continuing beneficial effect demonstrable in Australia since 1971 (Figure 2).

**TABLE I** Effect of compulsory seat belt legislation in Victoria, Australia, 1971*

<table>
<thead>
<tr>
<th></th>
<th>1970</th>
<th>1971</th>
<th>Percentage Change</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Victoria</td>
<td>564</td>
<td>464</td>
<td>-17.7</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Rest of Australia</td>
<td>1426</td>
<td>1429</td>
<td>+0.2</td>
<td></td>
</tr>
</tbody>
</table>


In view of the importance of alcohol consumption to traffic safety a significant effect on road crash mortality could be expected if an effective measure (or effective measures) were available. Our aim must be to produce a measurable effect on mortality at least comparable to that transiently achieved in England after 1967.
Let us go on to consider developments stemming from the breathalyser legislation. I will be mainly concerned with Victoria because it is the State that pioneered legislative innovation and hence provided new opportunities for collection of data. However the activities of the Research Section of the New South Wales Department of Motor Transport and the Federal Department of Transport have also been very significant.

There are three areas of research that have developed:

1. the drinking driver — in the wake of the breathalyser legislation;
2. the hospital casualty — stemming from legislation in South Australia (1973) and in Victoria (1974) requiring compulsory blood alcohol determination in all traffic casualties coming to emergency departments of hospitals, and
3. the introduction of random tests in Victoria (1976) and studies of the effect on road casualties.

**The Drinking Driver**

The blood alcohol levels found in the breathalysed drivers are very high — 65% of 8550 drivers in Melbourne were above 150 mg%, 51% of 6842 drivers in Sydney and 67% of 1146 in Brisbane. These levels indicate a serious drinking problem — as normal social drinkers would not be able to tolerate such levels and sit in front of a steering wheel, let alone attempt to drive a car!

A recent analysis of a group of 2002 breathalysed drivers in 1973 from Victoria has been made by Inspector J. Thomas, Officer-in-Charge of the Breathalyser Squad. The findings are shown in Table II which indicates the high levels obtained even in young drivers (up to 25 years of age) who comprise 42% of the sample although they comprise less than 20% of licensed drivers. There is a preponderance (75%) of blue-collar occupations (labourers, tradesmen, drivers, factory workers). There are two major age groups within the breathalysed driver population — young males aged 18-25, usually in the range 80-150%, and then another smaller male population around the age of 45 years with higher blood alcohol levels (between 200 and 250 mg%). In general under the age of 22 there is evidence of explosive drinking by young men at week-ends but after that age the number with blood alcohol in the range of 150-250 mg% increases indicating a chronic drinking problem.

**TABLE II**

<table>
<thead>
<tr>
<th>Age Group</th>
<th>No.</th>
<th>Ave BAC</th>
<th>White*</th>
<th>Blue*</th>
<th>Exec*</th>
<th>Ave Miles</th>
<th>Acc*</th>
<th>N/A*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 18</td>
<td>18</td>
<td>0.098</td>
<td>4</td>
<td>14</td>
<td>nil</td>
<td>6</td>
<td>6</td>
<td>12</td>
</tr>
<tr>
<td>18/19</td>
<td>223</td>
<td>0.104</td>
<td>24</td>
<td>197</td>
<td>2</td>
<td>6</td>
<td>63</td>
<td>160</td>
</tr>
<tr>
<td>20/21</td>
<td>232</td>
<td>0.112</td>
<td>47</td>
<td>185</td>
<td>nil</td>
<td>8</td>
<td>52</td>
<td>180</td>
</tr>
<tr>
<td>22/23</td>
<td>214</td>
<td>0.132</td>
<td>43</td>
<td>166</td>
<td>5</td>
<td>8</td>
<td>59</td>
<td>155</td>
</tr>
<tr>
<td>24/25</td>
<td>157</td>
<td>0.125</td>
<td>52</td>
<td>96</td>
<td>9</td>
<td>9</td>
<td>33</td>
<td>124</td>
</tr>
<tr>
<td>26/35</td>
<td>556</td>
<td>0.146</td>
<td>118</td>
<td>413</td>
<td>25</td>
<td>8</td>
<td>149</td>
<td>407</td>
</tr>
<tr>
<td>36/50</td>
<td>437</td>
<td>0.156</td>
<td>86</td>
<td>322</td>
<td>29</td>
<td>8</td>
<td>124</td>
<td>313</td>
</tr>
<tr>
<td>Over 50</td>
<td>165</td>
<td>0.154</td>
<td>32</td>
<td>120</td>
<td>13</td>
<td>7</td>
<td>70</td>
<td>95</td>
</tr>
<tr>
<td>Totals</td>
<td>2,002</td>
<td>0.128</td>
<td>406</td>
<td>1,513</td>
<td>83</td>
<td>7.5</td>
<td>556</td>
<td>1,446</td>
</tr>
</tbody>
</table>

* White-collar, Blue-Collar, Executive
+ Accident, Non-Accident
5 From Thomas, J., 'Victorian Breathalysed Drivers', Proceedings of the Summer School of Alcohol Studies, St. Vincent's Hospital, Melbourne, Australia, 1974.
In 1969 Anne Raymond began her detailed study of the characteristics of breathalysed drivers. She found that breathalysed drivers were almost all males. About one-third were under 25 years of age, and 70% were blue-collar workers. Their traffic conviction records differed markedly from those of the general driving population as they included 10 times as many convictions for serious traffic offences and for drink-driving offences (omitting any conviction resulting from the event which brought them into the survey). They had about three times the rate of criminal convictions found in the adult male population as a whole. More than half of them had blood alcohol levels exceeding 150 mg% when breathalysed indicating that they had been drinking excessively before being apprehended.17

There is similar data from Queensland1 indicating the association of criminal conviction with drivers involved in accidents — 60% of those involved in single vehicle accidents received criminal convictions in the subsequent 7 years.

These findings, together with evidence of gross ignorance about the intimate relation between drinking and driving, shed light on the problem of the young drinking driver and indicated the limitations of purely punitive measures by the Courts for such drivers. Rehabilitation courses designed to help convicted drivers in the age group of 18-25 years gain a better understanding of the risks involved in drinking excessively and in combining this with driving were started at St. Vincent’s Hospital, Melbourne, in August, 1973. Several other States have since followed with similar programs. In the Melbourne program each course consists of four sessions of two hours which are held at weekly intervals. Usually 8-10 drivers attend each course. They have been referred by a magistrate at the time of conviction for a drinking driving offence or when applying for restoration of their driver’s licence at the end of a period of disqualification.

Preliminary results indicate that these rehabilitation programmes directed to assist young drinking drivers do have some effect in reducing subsequent convictions.18 It is also clear that these young drivers need earlier help from our society than they receive at present. As Armstrong and Jamieson1 concluded from their 7 year follow-up study of drivers involved in accidents: ‘there may be a great place for remedial measures applied to individuals before they present as end-products in the transport system. Early identification of potential problems in school years may obviate many disasters not only on the road but also in society generally: adequate orientation of teachers to this end and social work in schools may be the most likely activity in this direction.’

A community survey of behaviour and attitudes conducted by the Traffic Accident Research Unit in New South Wales was published in May, 1973. The survey was a random one and included 1197 males and females between the ages of 17 and 69, in the Sydney metropolitan area. The main findings were as follows:

1. 70% of males and 20% of females have combined drinking with driving, some on many occasions.
2. The worst offenders were young men, especially those between the ages of 20 and 29. 60% of young men admitted that they frequently drove after drinking heavily.
3. Away from home, the commonest place to drink was in the hotel, and males usually drove home afterwards.
4. There were strong group pressures on young men to keep on drinking with their mates.
5. There was an unawareness of the role of alcohol in traffic accidents and particularly, on safe amounts to drink.
6. 80% of those interviewed claimed that the drink-driving legislation had not changed their drinking habits.

Incidentally, the survey revealed that 71% of 592 men and 83% of 605 women surveyed did not know of anyone who had had a breath test.

These results indicate clearly the dimension of the problem of community information and education about the facts of drinking and driving and the considerable barriers that
have yet to be overcome before there is a satisfactory penetration of the community with the basic facts on drinking and driving.

The Hospital Casualty

The development of this legislation was described at the last International Conference.\textsuperscript{14} It was initiated because of evidence that the hospital casualty department was indeed 'a haven for the alcoholic' as indicated by high blood levels in preliminary surveys. Legislation making compulsory the taking of blood samples on all injured traffic casualties coming to hospital for treatment became effective in South Australia in August, 1973, and in Victoria on April 8th, 1974. A doctor may make a statutory declaration if he conscientiously feels that the taking of the blood sample would interfere with the patient's management.

Blood alcohol determinations in the hospital casualty population reveal essentially the same results in both States. Samples collected between October 1, 1974, and September 30, 1975, from 11,090 driver casualties in Victoria revealed 24.7\% with detectable alcohol content 21\% equal to 50 mg\% or more and 11.2\% at levels of 150 mg\% or more.\textsuperscript{23} These levels compare with recent data from dead drivers indicating 42.9\% had blood alcohol levels in excess of 50 mg\%.\textsuperscript{15} There is therefore only a difference of degree between the two populations. A study of random drivers in the Australian Capital Territory in 1971/72 revealed only 4.2\% with levels in excess of 80 mg\%, so that the similarity between the hospital casualty and the dead driver is emphasised.\textsuperscript{8}

More detailed studies in one major hospital by Ryan et al.\textsuperscript{21} reveal about 60\% aged less than 30 years of age of 1266 persons (over the age of 15) presenting at the Alfred Hospital Casualty Department after a road crash on whom a blood sample was taken. The answers to detailed questionnaires revealed the expected association between alcohol level and drinking pattern.

These findings clearly indicate that the determination of blood alcohol level in hospital casualties following road crashes is able to detect those with drinking problems including, especially, males under the age of 30 years. The need for offering re-education and rehabilitation to these young traffic casualties with drinking problems is as urgent as in the case of convicted drivers. The motivation should be provided by the experience of injury and the likelihood of recurrence, possibly with fatal result to himself or somebody else, if the drinking problem continues. In the longer term, a series of medical and social complications can be anticipated in those drinking the equivalent of more than 80 g or 10 cl of absolute alcohol per day.\textsuperscript{6}

However apart from individual problems the data indicate a frightening level of heavy drinking in the Australian population. The presence of a major drinking problem in approximately 10\% of the hospital road casualty population must cause all of us great concern.

However, so far there has been no perceptible effect of the hospital legislation on traffic crash mortality in South Australia or Victoria. The new legislation has therefore been of benefit only in the identification of problem drinkers but has had no deterrent effect on drinking and driving in general.

However not nearly enough has been done to inform and educate the general public on these matters. The results of the regular collection of blood alcohol data from hospital casualties should be carefully analysed and passed on to the public through press, radio and television for general discussion and so secure the full penetration of the community with the facts. Reference to our model indicates the need to maintain a continuous cycle of public information as a preparation for social and political change.

Random Tests

The final step taken in Victoria has been the introduction of a trial period of random checks on drivers, effective from July 1, 1976. These tests have been introduced by the present State Government in the face of some protest from civil liberties groups but on the whole the
process has been smooth. However, so far enforcement has been limited — in general the number of drivers found with breathalyser levels in excess of 50 mg% has varied between 2% and 3% each month, which is lower than expected from the Australian Capital Territory's Survey results which revealed 4.2% of drivers in excess of 80 mg%.

Preliminary evidence indicates that random tests have been well accepted so far in Victoria. In 1976 three of four persons interviewed in a public opinion survey supported the tests. This contrasts with New South Wales where in 1973 50% were against, 42% in favour and 8% undecided. Evaluation of effects on drinking and driving behaviour is being carried out by the Road Safety and Traffic Authority in Victoria. Road crash injuries and deaths have not shown any striking change as yet. The blood alcohol range in hospital traffic casualties has remained similar to that evident before random checks were introduced on July 1, 1976. Finally information on attitudes and knowledge is being sought and comparison made with data gathered using a similar questionnaire before July 1, 1976.

So far, therefore, there is no evidence of impact on the road crash epidemic but there is room for much more active testing and mass media coverage. However at present the Victorian Government and the police are probably unwilling to go too far ahead of public opinion. It is in this connection that the present dimension of the problem needs to be honestly presented to the public. The social and political processes are closely linked with an adequate information system and mass media discussion. This did occur in the United Kingdom at the time of the passage of the breathalyser legislation in 1967, and would seem to be an important factor in the demonstrable effects on crashes, deaths and injuries.

GUIDELINES FOR THE FUTURE

It is clear from this review of current Australian research that the major problem defined is that of the young drinking driver. This emerges clearly from the studies of breathalysed drivers (42% up to 25 years of age) and from the studies of hospital casualties (60% less than 30 years of age). It is also revealed by studies of fatalities — 46.9% under 30 years of age including 30% with blood alcohol levels above 150 mg%.15

It is also clear that these young drivers have levels strongly suggestive of heavy drinking and not just social drinking. The pattern is such that these drivers, and their associated passengers, must be considered at high risk for the development of the sequence of problem drinking — including medical and social effects that have been well documented in Australia,26 apart altogether from the likelihood of a further serious crash with fatal effects to the driver himself, or his passenger, a pedestrian, or another driver and passenger.

We have noted the efforts being made to rehabilitate these young drivers following court action. There is evidence of some success in this area but much more follow-up is required.

However we must go further and examine the question of prevention which is so clearly indicated. So far the recent Australian legislation has not been effective in reducing the road toll — there has not even been evidence of a transient effect as occurred in the United Kingdom after 1967. This probably indicates the difficulty of community penetration in a large country like Australia with its various States in contrast to the cohesive community in the United Kingdom.

However, a significant impact on the road toll has been achieved with the compulsory seat belt legislation in Australia. An initial impact in the small and cohesive State of Victoria has led to a national impact across the whole Continent. This may well be the way for future road safety programmes to be developed in this country.

However we have noted that much more penetration of the community could be achieved in Australia by appropriate presentation of recent research findings in the mass media which might well lead to some impact on the road toll.
A vigorous mass media campaign has been waged from time to time in the various States of Australia. The most recent example is Tasmania where in 1976 a special program with the theme ‘No more mate — I’m driving’ has been associated with a fall in road deaths involving alcohol from 51% to 36% in two car crashes and 72% to 56% in single car crashes. If we accept the data at face value, it indicates the possibility of much more benefit to road safety than has so far been gained from present knowledge, arising from greater penetration of the community with the available facts.

THE GENESIS OF THE DRINKING DRIVER

If we accept the young drinking driver as the major problem — what about the genesis of his drinking pattern? We have already noted the close association with individual and social handicaps. This drinking pattern is clearly due to a combination of individual and social factors. While the individual factors may be assisted with social and rehabilitative services the social factors require more discussion.

Here we recognise that individual attitudes and behaviour are greatly influenced by the attitudes and behaviour of social groups and society in general. In the case of alcohol consumption Australian society has presuppositions, particularly related to the association of heavy drinking and manliness. In other words the young heavy drinking driver is a natural product of our current Australian society — a heavy drinking society especially affecting the young male. There is evidence indicating the increasing alcohol consumption among younger age groups in Australia, which is a major component in the progressive and increasing alcohol consumption that has occurred in Australia since 1945.

Australian society cannot escape some social responsibility for the drinking pattern of the young. There is the issue of the present unrestricted promotion of alcohol among the young as well as the issue of increasing availability. Partly due to increasing promotion and availability, alcohol consumption has increased in Australia — but does this mean an increasing number of heavy drinkers and therefore an increasing number at risk on the roads? Current data indicate that the pattern of alcohol consumption in Australia is unimodal, and not bimodal as would be expected by conventional wisdom and clinical impression. There is no sharp demarcation between the heavy drinker and the community at large (Figure 3). This suggests that as the general level of consumption increases so does the number of heavy drinkers increase.

In a careful review for the World Health Organisation, Bruun et al. have considered the data available on the empirical relation between per capita consumption and prevalence of heavy use. The data available indicate clearly that increase in per capita consumption leads to an increase in heavy users — i.e. the number of heavy users does not remain steady as conventional wisdom might suggest. This applies to differences between countries as well as differences within countries. It can be explained by the fact that increased social usage is highly contagious. This is undoubtedly true of Australia since the War, where high social approval of alcohol constantly reduces inhibitions against its use and hence increased usage. There is therefore a prima facie case for consideration of measures that will reduce the level of alcohol consumption in the community at large. These include education, control of promotion and control of availability. They might also include consideration of lower alcohol content beverages — especially beer.

A recent examination of the feasibility of a low alcohol content beer (2% compared to 5% in normal Australian beer) has been carried out by Mr Rex Harcourt, formerly Research Director of the Victorian Royal Commission of 1964-65. The feasibility of beer being available at both 2% and 5% alcohol contents was discussed by the Victorian Royal Commission. Preliminary studies in Adelaide in 1965 indicated that the low alcohol beer could not be recognised after the first few drinks when a social gathering was well established! The combination of less frequent drinking with a 2% alcohol content beer would do much to keep the blood
alcohol content below 50 mg%. Introduction of such a beer accompanied by an appropriate education campaign would seem an important option for further exploration in 1977 when there is much greater awareness of the problem than in 1965. In Victoria these various matters are now being actively discussed and investigated by the Alcohol Counter-Measures Sub-Committee of the Road Safety and Traffic Authority, under the Chairman of the Authority, Dr. Peter Vulcan. This Sub-Committee is representative of the community (the motorists organisation R.A.C.V.), professional groups (Australian Medical Association, Royal Australasian College of Surgeons), the police, and specialists (clinicians, epidemiologists, social scientists, traffic engineers). As part of a State Government body it is in direct contact with the Government. It is in a position to constantly review findings of new approaches relevant to the alcohol and road safety problem. I feel hopeful that with appropriate support by the Government and the community, it can make an increasing impact.

ALCOHOL CONSUMPTION – THE WIDER ISSUE

In conclusion it is clear that it is not possible to separate the problem of alcohol and road safety from the problem of alcohol consumption itself. In Australia we know that alcohol consumption has progressively increased since 1945 (Figure 4) and it seems unlikely that a significant impact will be made on the road toll if this basic problem is not faced. So far the recent legislative measures have succeeded in leading to identification of many problem drinkers at an early stage of their careers, but there has been no effect on the mounting road crash epidemic of death and injury. The question may well be asked: as long as alcohol consumption is increasing in Australia, is not a steadily increasing road toll inevitable? The only answer that can be given is yes.
In the recent Blennerhassett report, in the United Kingdom, the early impact of the Road Safety Act (1967) is described — over a thousand lives saved in the first year and a further 4,000 lives in later years. However, the fall in casualties (largely accounted for by a reduction of a third in accidents between 10 p.m. and 4 a.m.) has since worn off. There was a fall from 25% of drivers who died in accidents with blood alcohol in excess of 80 mg% before the legislation, to 15% in 1968, but this was back to 26% by 1971 and had reached 35% in 1974.

The report goes on to say: ‘we have been forced to recognise that drinking and driving are part of a wider problem of alcohol abuse in Britain today. National consumption rose by 39% between 1968 and 1974. Among young people it is believed to be rising even more rapidly’. The Committee stated that ‘we felt it must be recognised that the growing abuse of alcohol is a major factor, possibly the major factor, in the declining effectiveness of the 1967 Act’.

In Australia per capita consumption of alcohol has increased from 7.0 litres per head per year in 1966 to 9.78 litres per head per year in 1974. This is an increase of 38.6% in 8 years (a rise similar to that of the U.K. but from an initial higher Australian level). It is hardly surprising that our road toll is increasing in spite of the benefits of seat belts.

In 1974–75 Australians spent $2039 million on alcohol, about one-third of the amount spent on food! This is the equivalent of $151.39 spent by every Australian or $225.87 for each person over the age of 18 years. These facts indicate that until Australian society is able to handle alcohol more responsibly, the future of road safety in this country must be viewed with great concern.
REFERENCES


