

A road side survey of drinking drivers in Perth, Western Australia

Ryan, G.A.

Road Accident Prevention Research Unit, Department of Public Health
The University of Western Australia

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Abstract

A police 'booze' bus was used to obtain a systematic sample of breath tests from drivers in Perth, Western Australia between 2200 and 0300 on Thursday, Friday and Saturday nights over about six weeks in September and October, 1999. Of the 8616 tests, 1.92% were over 0.05gm%, the legal limit. There was a higher percentage of drivers with an illegal blood alcohol concentration (BAC) on Friday nights and after midnight compared with other times. The blood alcohol distribution of survey drivers was compared with that of drivers involved in crashes during the same hours and days of the week for 1997. The ratio of crash to survey drivers at a BAC of 0.05 was about 5:1, at 0.08, about 25:1 and over 0.150, about 80:1. This survey has provided a baseline description of the drink driving behaviour of drivers in Perth for comparison with subsequent surveys in following years.

Introduction

Random breath testing was introduced in Western Australia in 1988. In July 1992 the legal limit for blood alcohol concentration was reduced from 0.08 to 0.05gm%. In July 1995 two 'booze' buses were introduced, accompanied by an increase in intensity of public education via television and other media. Reviews of this program have detected only small changes in self-reported drink driving behaviour and in alcohol-related fatal motor vehicle crashes and surrogate measures of alcohol related crashes (1, 2). These reviews demonstrated that there was a need for a better measure of the frequency of drink driving than that provided by police reported data. The number of charges for driving over the legal BAC limit, as reported by police is influenced by changes in police operations and related policies as well as by changes in the behaviour of drivers. To overcome this well recognised problem, Matthijsen in the Netherlands used police officers to obtain a systematic sample of drivers as a measure of the performance of the drink driving program (3). Other investigators have used police units to stop drivers in roadside surveys in New Zealand (4), the USA (5) and in the UK (6). McLean in Adelaide has developed a method of stopping drivers without using police (7). The survey reported here used one police breath testing bus to obtain a sample of drivers by testing at times and sites directed by the author over a period of six weeks, with the intention being to repeat the operation in subsequent years at the same time, as a measure of the effect of the drink driving enforcement and public education program.

Aim

The aim of this survey was to obtain breath tests from a sample of drivers in metropolitan Perth between 10pm and 3am on Thursday, Friday and Saturday nights over six weeks in September and October 1999, and to repeat the survey in subsequent years.

Method

The Breath Analysis Section of the WA Police Service agreed to deploy one booze bus and staff on Thursday, Friday and Saturday nights for a period of approximately six weeks to take part in the survey. Thirty six sites were chosen on the major traffic routes across the metropolitan area. A schedule was developed with 1.5 hour testing periods at each of two sites per night, with an hour allowed for travel and set up between sites. Start times were alternated between 10pm (2200 hours) and 11pm (2300 hours) with finish times at 2am (0200) and 3am (0300) respectively. The resulting schedule had four testing periods: 2200-2330, 2300-0030, 0030-0200 and 0130-0300. There were overlaps from 2300 to 2330 and again from 0100 to 0130. This was accepted to retain simplicity in the work pattern and was a compromise between statistical and practical necessity.

At each site, testing operations were carried out according to usual police procedures. The booze buses are equipped with an evidentiary breath testing unit, computer facilities to download data from the hand-held breath machines to the enforcement database, a data link to the main police computer, and the facilities necessary to charge drivers found to have a BAC level over the legal limit. The buses are staffed by recent graduates from the Police Academy. At each site, officers with hand held breath testing devices are stationed along a lane defined with cones or 'witches hats'. Vehicles are diverted into the testing lane until it is full, then vehicles are directed past until there is space available, when the next vehicles approaching are directed into the lane. All drivers in the testing lane are tested. When vehicle flows were lower, all vehicles passing were tested.

At the beginning of the testing period there could be up to six officers testing. When an officer finds a driver with a preliminary breath test of 0.05gm% or higher, the driver is asked to leave the car, which is driven off the road to a safe parking place by another officer. The first officer then accompanies the driver to the bus, records his particulars and maintains a watch that the driver takes nothing by mouth while they wait 20 minutes before an evidentiary breath test is performed. The evidentiary test is performed on a Drager 4000 breath analysis machine in the bus. Depending on the results of the test the driver is released, or charged with the appropriate offence. Checks of driver license records and other police records can be made from the bus. In WA, alone among the Australian states, the result of the evidentiary test is back-calculated, under the assumption that the driver's BAC is rising, to what it would have been at the time of the offence, ie the preliminary test. This can result in the situation where a driver with a falling (rather than a rising) BAC has a back-calculated BAC which is below the legal limit and consequently is not charged, or is charged with a lesser offence than would be indicated by the evidentiary test. The author attended each testing session and recorded the age, sex, preliminary BAC, evidentiary BAC and the back-calculated BAC for each driver over 0.05. He did not interview any drivers.

There were no refusals. One driver elected to have a blood test, and one further driver was taken for a blood test after failing to provide an adequate breath sample after three attempts. Refusal to take a breath test, or failure to comply, results in a penalty equivalent to that for a charge of Driving Under the Influence or having a BAC greater than 0.150gm%.

Results

Over the 36 sites, 8616 breath tests were performed. There was a failure of the download system after two sessions, so the number of positive tests and those below 0.05 was not available for those sessions, but the number of tests over 0.05 was recorded separately by the author during each session. Adjusting for these events, it was found that 1.92% of drivers had a BAC of 0.05gm% or above (Table 1). About 15% of drivers tested had a positive BAC, and of those, 88% were below 0.05, 7% were 0.05 or above but below 0.08, about 5% were 0.08 or above but below 0.150 and about 1% were 0.150 or above. Looked at another way, just over half of those 0.05 and above were below 0.08, 40% were below 0.150 and 7% were 0.150 or above. One driver with a probationary licence exceeded the BAC limit of 0.02. This case was excluded from the subsequent analysis.

Table 1: Distribution of blood alcohol concentration of drivers in Perth

Total tests	Positive	Blood alcohol concentration (gm%)					
		<0.05	0.05-0.079	0.08-0.149	0.150+	>0.02	≥0.05
8616	1206/8093*	1058/8093*	88	66	11	1	165
100%	14.90	13.07	1.02	0.77	0.13	0.01	1.92
	% of those positive	87.7	6.8	5.2	0.9	-	-
		% of those ≥0.05	53.3	40.0	6.7	-	-

* data from two sites missing

Day of week. Table 2 shows that the number of tests obtained on each day of testing was very similar, with about 18% of drivers having a positive BAC on Friday, compared with about 13% on Thursday and Saturday. Just over 2.4% of drivers on Friday had a BAC of 0.05 or greater, compared with 1.3% on Thursday and 1.7% on Saturday. The percentage of drivers over 0.08 on Friday (1.5%) was two to three times that for Thursday (0.3%) or Saturday (0.7%). Expressed another way, about 65% of those over 0.05 on Friday had a BAC of 0.08 or greater, compared with 26% for Thursday and 40% for Saturday. It appears that drivers with a high BAC are more frequently found on Friday night than Saturday or Thursday.

Table 2: Day of week and blood alcohol concentration, drivers in Perth, October 1999

Day	Total tests	Positive	Blood alcohol concentration (gm%)				
			<0.05	0.05-0.079	0.08-0.149	0.150+	≥0.05
	n	%	%	%	%	%	%
Thursday	2654	12.89	11.61	0.94	0.30	0.04	1.28
Friday	2831	18.30	15.86	0.85	1.31	0.28	2.44
Saturday	2608	13.27	11.54	1.04	0.65	0.04	1.73

Time of day. Table 3 shows the distribution of BAC by time of day. The number of drivers tested decreased markedly after midnight, reflecting the decreased traffic volume at these times. The percentage of drivers with a positive BAC increased only slightly from about 13% at 2200 hours to about 16% for the remaining periods, but the percentage of drivers with a BAC of 0.05 or more increased steadily from about 1% at 2200-2300 to 4% at 0130-0300.

This gradient by time was consistently found for each day. There was a much greater percentage of drivers with a BAC of 0.08 or greater after 0030 hours (57.6%) than before (40.0%) (Table 4).

Table 3: Time of day and blood alcohol concentration of drivers, Perth

Time	Blood alcohol concentration (gm%)						
	Total tests	Positive	<0.05	0.05-0.079	0.08-0.149	0.150+	≥0.05
	n	%	%	%	%	%	%
2200-2330	2892	13.14	11.96	0.59	0.55	0.03	1.18
2300-0030	2555	15.77	14.17	1.10	0.47	0.04	1.60
0030-0200	1774	16.01	13.87	0.90	0.96	0.28	2.14
0130-0300	872	15.94	11.93	1.72	1.95	0.34	4.01

Table 4: Time of day and BAC ≥ 0.05, drivers in Perth, October 1999

Time	Blood alcohol concentration (gm%)				
	Total tests	0.05-0.079	0.08-0.149	0.150+	≥0.05
	n	%	%	%	%
2200-0030	75	60.0	37.3	2.7	100.0
0030-0300	73	42.5	46.6	11.0	100.0

Comparison with the BAC distribution of drivers involved in crashes. By comparing the distribution of BAC for drivers in the survey and drivers involved in crashes in the Perth metropolitan area at the same times and days as the survey, it was possible to estimate the effect of elevated BAC on the risk of being involved in a crash.

The BAC of drivers involved in crashes in the Perth metropolitan area on Thursday, Friday and Saturday nights between 2200 and 0300 hours during 1997 was obtained from the Road Injury Database held by the Unit. BACs were available for 1230 (67.8%) of drivers involved in police-reported crashes. The distribution of BAC of these drivers is set out in Table 5, together with the distribution of all drivers tested in the survey. It can be seen that only 1.92% of drivers surveyed had a BAC of 0.05 or greater, compared with 33.01% of drivers involved in crashes. The ratio of the percentages of crashed drivers to survey drivers at each BAC interval increased from 4.8 at 0.05, to 23.3 at 0.08 and 78.1 at 0.150 (Figure 1). This demonstrates yet again, the influence of BAC on the risk of being involved in a crash.

Table 5: Comparison of BAC for drivers surveyed and drivers in crashes. Thursday, Friday and Saturday, 2200-0300 hours, Perth, WA.

Drivers	Blood alcohol distribution (gm%)					
	Number	Nil	<0.05	≥0.05	≥0.08	≥0.150
		%	%	%	%	%
Survey ⁽¹⁾	8616	85.01	13.07	1.02	0.77	0.13
Crash ⁽²⁾	1230	58.86	8.13	4.88	17.97	10.16
Ratio ^{(2)/(1)}		0.69	0.62	4.78	23.34	78.15

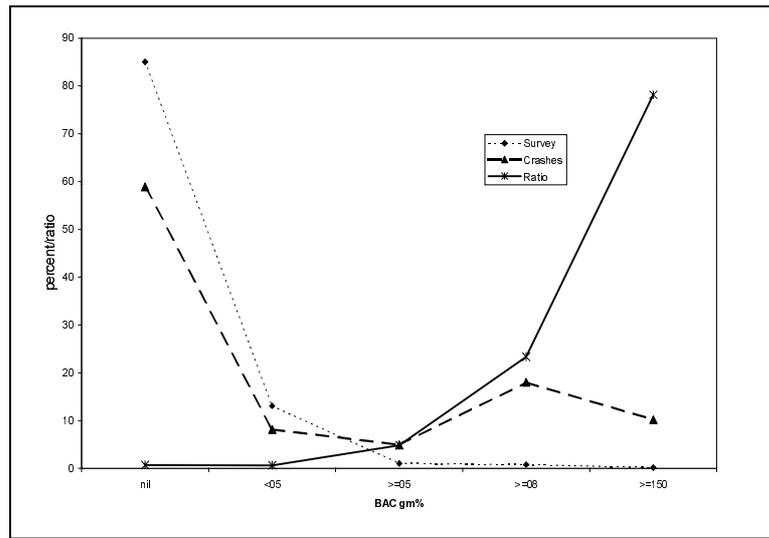


Figure 1 Ratio of BAC distribution of survey and crashed drivers, Perth, Western Australia

Discussion

The aim of this project was to obtain breath tests from a systematic sample of drivers in Perth at times which were known to be associated with drink driving. The sites were chosen for operational safety, with adequate lighting, they were not near licensed premises, and there was minimal opportunity to turn off at initial sighting of the testing station. At most sites a police car was available to pursue vehicles which appeared to turn off to avoid the testing station. Every driver that was stopped was tested, but not all drivers passing the testing station were stopped. The selection of vehicles for stopping was based on the processing capacity of the testing lane, not on any characteristic of the vehicles. The testing capacity of the testing lane varied with time. If the rate of arrival of drivers found to be over the limit exceeded the rate at which they could be processed, the number of officers available for testing decreased, often markedly, so that, on occasions, by the end of the session, the station was effectively closed. This means that the effect of the overlap in sampling periods between 2300 and 2330 and between 0130 and 0200 in terms of over-enumeration of cases with a positive BAC was minimised, as the overlap was between the last part of a sampling period when the number of officers testing tended to be depleted, and the beginning of a sampling period, when the full complement was available. No drivers refused a breath test. These considerations suggest that some confidence can be placed in the results of this survey.

These findings are similar to those in Adelaide in 1997, where 2.3% of drivers had a BAC of ≥ 0.05 (8), but lower than in the Netherlands in 1996, where 4.4% of drivers had a BAC of ≥ 0.05 (9). The level of drink driving was rather higher on Friday evenings than on Saturday or

Thursday, both in terms of proportion of drivers who had been drinking and the large proportion who were over 0.08, compared with the other nights. This, and the finding that there was a marked increase in drivers with a high BAC after midnight has implications for enforcement and for those serving and providing alcohol. Finally, comparison of the BAC distribution of drivers in the survey with those involved in crashes demonstrated again the very powerful effect that alcohol has on the risk of a crash. The exponential increase in risk observed was first shown by Borkenstein et al in the USA in 1974 (10), and in Australia by McLean in 1980 (8). This survey has provided a clear description of the drink driving behaviour of drivers in Perth as a baseline for comparison with subsequent surveys in following years.

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