

Characteristics of alcohol impaired road users involved in casualty crashes

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Abstract

This presentation reports on the findings of a study of alcohol impaired road users involved in casualty crashes. The study linked data from multiple sources to present a more comprehensive profile of the person, crash and licensing characteristics of a group of 1490 road users admitted to hospital as a result of crash involvement between 2008 and 2010. An alcohol reading was known for 1204 of the 1490 cases. Alcohol impairment was found to be a contributing factor to crash causation in 274 cases, constituting 18.4 per cent of the sample. Close to 20% of participants in the study did not have an alcohol reading available for scrutiny. When only those cases where an alcohol reading was available were examined, it was found that close to 23% of participants were involved in their crash while alcohol impaired. Impairment was found across all road user types but was particularly noted amongst pedestrians (55.8% of pedestrians that were tested) and drivers (24.3% of drivers that were tested). An established diagnosis of alcohol dependence was identified for 146 of the 1490 participants in this study, constituting 9.8%. Indigenous Australians were identified as a vulnerable group found to be at an increased risk of being involved in a crash as the result of alcohol impairment. More than 40 per cent of those participants identified as being alcohol impaired in this study were found to have incurred at least one previous infringement that involved driving with an alcohol level above 0.05gm/100ml and were twice as likely to have had at least one period of licence disqualification when compared with those participants who were not impaired. More than 12% of the alcohol impaired participants had been involved in at least one previous crash whilst intoxicated.

Key words: Drink driving, alcohol dependence, driver behaviour, pedestrian, driver, motor cyclist, road user behaviour, recidivism, licence suspension

1. Introduction

Road users who are impaired as the result of alcohol and the role that impairment takes in crash causation has been recognised as a road safety issue in Australia as well as other jurisdictions throughout the motorised world. This recognition has led to numerous studies that have attempted to identify the key issues [Fell (2009), Fabbri (2005), Hutchinson (2011), Longo (200), Mann (2010), Stevenson (2003), Stough (2010), Vingilis (2008), Voas (2006)]. The knowledge gained in these and other studies has led to the development of countermeasures that have resulted in a reduction in alcohol related crashes as well as a demonstrable shift in public thinking and acceptability of alcohol impaired driving [Transport Research Board (1994)]. Yet the problem of alcohol impairment continues to be one area of concern in road safety that requires further countermeasure development.

Between 2008 and 2010 the Centre for Automotive Safety Research undertook a study investigating the prevalence of medical conditions and acute medical events as a contributing factor in casualty crash causation [Lindsay and Ryan (2011)]. The study involved examination of the circumstances surrounding all drivers, motorcycle riders, cyclists and pedestrians involved in casualty crashes on public roads in South Australia who were admitted to the Royal Adelaide Hospital over the three year period from January 2008 to December 2010. During the course of the study the records of 1490 individuals meeting the selection criteria were made available. Data for each of these 1490 crash involved participants were matched with data from multiple sources. Data matched included medical records data generated during hospitalisation, police data related to the current and previous crashes, licensing records and forensic science data related to mandatory testing for alcohol and drugs. Analysis of this data showed that alcohol impairment was the leading contributing factor in the crashes investigated. More than 18 per cent of all active crash participants were

found to have a blood alcohol level or breath alcohol level above 0.05 at the time of their crash. The study also found that alcohol dependence was identified in close to 10 per cent of all participants.

This paper further explores the data collected for those active participants who were identified as being impaired as the result of alcohol at the time of their crash. The paper attempts to identify common themes amongst this group by road user type and to determine key issues that may lead to a better understanding of those road users who may be at an increased risk of crash involvement as a result of alcohol impairment. This analysis has the potential to lead to a better understanding of those who are at risk of crash involvement as a result of alcohol impairment and lead to further countermeasure development related to alcohol affected road users.

2. Method

2.1 Overview

The main purpose was to identify the person, licensing and crash characteristics for a group of drivers, motorcycle riders, pedestrians and cyclists who were identified as being involved in a casualty crash as the result of alcohol impairment. For the purposes of this study an alcohol impaired participant was defined as any active participant with a blood alcohol concentration (BAC) above 0.05gm/100ml or a breath analysis result of 0.05 or more. Of the 1490 participants in the study there were 274 drivers, motorcycle riders, pedestrians and cyclists who were known to have an alcohol level that met the inclusion criteria. Data for each of these 274 participants were matched using four discrete data sources:

2.2 Medical records

Medical records related to the participants in the study were sourced at the Royal Adelaide Hospital following approval from the Royal Adelaide Hospital Research Ethics Committee and the University of Adelaide Compliance and Ethics Unit. All persons who present to the Royal Adelaide Hospital for medical care that is of four hours duration or more are formally admitted to the hospital and are required to undergo International Classification of Disease coding utilising version ten, Australian Modification (ICD-10-AM). Within the ICD-10-AM are specific codes related to external sources of injury, some of which relate to road crashes (V codes). From these codes those individuals who were admitted to the hospital as a result of a motor vehicle accident were able to be identified. The original, primary source, medical records in these cases were examined in detail. The information available in the records included: South Australian Ambulance Service (SAAS) and/or Medical Retrieval reports, Emergency Department and in-patient records.

The Royal Adelaide Hospital (RAH) is a 650 bed tertiary referral hospital located in Adelaide. The hospital is one of two designated adult major trauma services in South Australia with the services provided by the hospital catering for over two thirds of the total state workload. As one of the major tertiary care providers, the RAH provides some specialist services that are not provided in other centres; included among these are specialist trauma, spinal and orthopaedic care, burns unit, brain injury and brain injury rehabilitation services. During the course of data collection for the study there were 253 cases where the person involved in the crash as a participant was first seen at a regional hospital outside the metropolitan area before being transferred to the RAH for continuation of care. A further 62 participants were transferred for specialist care offered by the RAH that was not available in the metropolitan hospital they first attended. These 315 cases represent more than 21% of all cases that presented to the hospital during the study period.

2.3 Police generated records

Two discrete sources of information related to Police records were made available: Vehicle Collision Reports (VCR) and the Traffic Accident Reporting System (TARS). Information found in the Police crash records includes data related to both the current crash and any previous crashes that have been reported to Police. Police data related to previous crash history provides information related to licenced drivers and motorcycle riders only as this data can not be searched for pedestrians and cyclists.

2.4 Licensing records

The licensing records related to those drivers and motorcycle riders involved in crashes were sourced at the Department of Planning, Transport, and Infrastructure (DPTI). This licensing information is available for South Australian licenced drivers and motorcycle riders and is not available for pedestrians or cyclists who may or may not hold a current licence. Information gathered from this source included: class and type of licence held, infringement history and history of previous periods of licence disqualification.

2.5 Forensic Science records

Since 1972 crash involved persons over the age of fourteen years, who present to hospital as a result of a crash, have been required to undergo mandatory testing for blood alcohol concentration in South Australia. This legislation requires a blood sample to be taken by hospital medical personnel within eight hours of being involved in the collision. The samples are sent to, and tested by, the South Australian Forensic Science Centre.

3. Results

The records for the 1490 participants were examined for objective data that supported alcohol impairment as a contributing factor at the time of crash involvement. As stated earlier, an alcohol impaired participant was defined as any active participant with a blood alcohol concentration (BAC) above 0.05gm/100ml or a participant with a breath analysis result of 0.05 or more. Participants were identified as being involved in a crash as the result of alcohol impairment primarily on the data sourced from the Forensic Science blood alcohol testing results.

Although testing for blood alcohol concentration (BAC) is mandatory for those who attend hospital as the result of crash involvement in South Australia, among the 1490 participants in the study there were 238 cases where a sample was unable to be confidently matched from this source. This was particularly the case for pedestrians where it was found that a Forensic Science blood alcohol result was identified in only 50 per cent of cases; the remaining missing data related to drivers, motorcycle riders and cyclists, accounting for approximately 12 per cent of these cases. In addition there were 48 cases overall where a blood sample was taken but the sample was found to have denatured and therefore unable to be analysed. Of the cases where a BAC was known from this source, there were 232 cases where the blood alcohol concentration was found to be above 0.05gm/100ml.

A secondary source of objective information related to alcohol levels was the hospital Emergency Department records. These records frequently provided alcohol readings from breath testing undertaken on presentation to the department. In the 286 cases where no Forensic Science data was available these breath alcohol test results were sourced. Among the 286 cases there were 42 cases where a breath alcohol result above 0.05 was identified in the Emergency Department records. The results of these 42 cases were included with those from the Forensic Science data, bringing a total of known cases of alcohol levels above 0.05 to 274 cases. These 274 cases represent 18.4 per cent of the 1490 cases. Given the number of cases that were unable to be matched with a reliable source it is expected that the real

impact of alcohol in crash causation is greater than that presented here.

Data from the four sources were linked for the 274 cases where alcohol impairment in crash causation was established. The results are addressed in the following section and include an examination of the person, licensing and crash characteristics of those involved in a crash due to alcohol impairment. These characteristics were found to differ between the four different road user groups, in particular the characteristics of pedestrians differed from those of drivers and motorcycle riders. As a result of the identified differences, the road user types are addressed separately in some sections. Comparisons between those road users who were identified as impaired by alcohol and those who were not impaired are discussed.

3.1 Person characteristics of those who were alcohol impaired

3.1.1 Road user type

There were 274 cases where an active participant was identified as being involved in their crash while impaired as the result of an alcohol level above 0.05. These 274 cases represent 18.4 per cent of the 1490 active participants. Given that close to 20% of participants were unable to be matched with a reliable source of objective alcohol reading, this figure is likely to be an underestimate of the impact of alcohol impairment. When only those cases where an alcohol reading was available were examined, it was found that close to 23% of participants were involved in their crash while alcohol impaired. This was particularly the case for pedestrians, where it was found that more than 55% of those tested for alcohol had a level that was 0.05 or more. Those involved in their crash as the result of alcohol impairment were found across all road user groups and involved 182 drivers, 36 motorcycle riders, 53 pedestrians and three cyclists. Table 1 provides a breakdown by number and percentage for each road user type. Table 2 provides these breakdowns as they relate to the 1204 participants where an alcohol reading was available.

Table 1: Number and percentage of cases involving a participant with a known alcohol level above 0.05 by road user type

	Drivers	Riders	Pedestrians	Cyclists	Total
Total cases	845	377	207	61	1490
Alcohol cases	182	36	53	3	274
Percentage	21.54%	9.55%	25.60%	4.97%	18.39%

Table 2: Number and percentage of cases involving a participant with an alcohol level above 0.05 for those with a known alcohol reading result by road user type

	Drivers	Riders	Pedestrians	Cyclists	Total
Total cases	748	326	95	38	1204
Alcohol cases	182	36	53	3	274
Percentage	24.33%	11.04%	55.79%	7.89%	22.76%

3.1.2 Age and sex distribution

Those with an alcohol level above 0.05 were found across all age groups with those between the ages of 20 and 49 years making up close to 80 per cent of the total. While males made up 70 per cent of all active participants in the study group, they made up more than 75 per cent of cases involving a participant with an alcohol level over 0.05. In more than 62 per cent of cases alcohol impaired drivers were more likely to be between the ages of 20 and 39

years while almost half of all impaired motorcycle riders were in the 40 to 49 year age grouping. Alcohol impaired pedestrians were found across all age groups and were more likely than drivers and riders to be between the ages of 16 and 19 years (15% of pedestrians, compared to 9% of alcohol impaired drivers and riders) and between 50 and 79 years (14% of pedestrians, compared to 9% of alcohol impaired drivers and riders).

3.1.3 Indigenous Australians

Alcohol impairment substantiated by an objective alcohol reading was found in 25 of the 46 participants identified in medical records as being Indigenous Australians, constituting 54.4 per cent of all Indigenous road users in the study. Pedestrians were more likely than drivers and riders in this group to have been impaired, with 65.2 per cent of Indigenous pedestrians having an alcohol level above 0.05. This compares to 20.6 per cent of those pedestrians who were not Indigenous. In addition to the above figures there were a further seven cases involving an Indigenous pedestrian where there was medical documentation that stated that the participant was intoxicated on alcohol at the time of the crash, accounting for a further 30.4 per cent of the Indigenous pedestrians (these seven cases are not included in any analysis or findings presented in this paper). A recorded alcohol level above 0.5 was found amongst 47.4 per cent of Indigenous drivers and 25 per cent of Indigenous riders.

3.1.4 Levels of alcohol

Close to 90 per cent of alcohol impaired participants were found to have an alcohol level of 0.1 or above, the majority of whom had an alcohol level between 0.1 and 0.299. Fewer than 5.5 per cent of the alcohol impaired participants had an alcohol reading above 0.3. More than half (55%) of all drivers and motorcycle riders impaired as the result of alcohol were found to have an alcohol level ranging between 0.1 and 0.199. Motorcycle riders were more likely than drivers to have an alcohol level above 0.2, with a third of all riders having an alcohol level within this range compared to 27.5 per cent of drivers. Alcohol levels for pedestrians were higher than those seen for all other road users, with more than half (54.6%) of all pedestrians who were known to be impaired having an alcohol level that was greater than 0.2. Close to 17 per cent of all alcohol impaired pedestrians had an alcohol level above 0.3; this compares to less than 3 per cent of drivers and motorcycle riders.

3.1.5 Acute alcohol intoxication in a climate of known dependence

Alcohol dependence, as determined by the treating medical personnel, was identified in medical record documentation for 146 of the 1490 participants in the medical conditions study [Lindsay and Ryan (2011)]. Of these, 73 participants (50%) were found to have an alcohol level above 0.05 at the time of the crash. Although this group were found across all road user types it was most noted amongst pedestrians. More than 45 per cent of pedestrians with an alcohol reading above 0.05 were identified as being alcohol dependent by the treating medical personnel; this compares to 25 per cent of the impaired motorcycle riders and 20.1 per cent of impaired drivers. In 42 cases the participant identified as alcohol dependent had a blood alcohol reading of 0.00 at the time of the crash. There was also one participant with an alcohol reading that was positive but less than 0.05. An alcohol reading was not recorded for 30 (21%) of participants who were identified as being alcohol dependent, 17 of whom were pedestrians. Given that these 30 participants did not undergo alcohol testing, it is proposed that the 50 per cent figure quoted above is conservative.

The level of alcohol found between those alcohol impaired road users that were known to have alcohol dependence were compared with those where no alcohol dependence was identified. As might be expected, those with the highest alcohol levels were more likely to have alcohol dependence identified as a pre-existing condition. It was found that fewer than 20 per cent of participants with an alcohol level of less than 0.2 were found to have an

established diagnosis of alcohol dependence compared with more than 42 per cent of those with an alcohol level greater than 0.2.

The medical records identified 93 drivers and motorcyclists as being alcohol dependent. However, there is a likelihood that this figure does not reflect the true nature of the problem. For example, a review of the infringement records for the drivers and motorcycle riders who were known to have an alcohol reading above 0.2, but not known to be alcohol dependent, at the time of the crash was undertaken. It is not suggested that an alcohol reading of 0.2 is diagnostic of alcohol dependence, but rather that a participant with a reading of this level may more closely reflect those who at least have a problem with alcohol. The review found that 21 (34.4%) of the drivers and motorcycle riders who had an alcohol reading of 0.2 or above in their crash, had a history of at least one previous infringement related to driving whilst alcohol impaired. In five of these cases the driver or motorcycle rider had a history of between three to five previous alcohol related infringements.

3.2 Crash characteristics of those who were alcohol impaired

3.2.1 Time of day of crash

Crashes involving alcohol impaired road users were found to have occurred over all time periods throughout the day, however, not unexpectedly, more than 57 per cent occurred between 2000 hours and 0400 hours. The times seen to be most prevalent, however, differed between the road user types. Almost half (47%) of the impaired motorcycle riders were involved in a crash between 1600 hours and 2000 hours; this compares with less than 20 per cent of crashes involving an alcohol impaired driver. Drivers were three times more likely to be involved in a crash due to alcohol impairment between 0000 hours and 0359 hours than motorcycle riders, with 35 per cent of crashes for alcohol impaired drivers occurring during this time period compared to 11 per cent of crashes involving an impaired rider. Crashes involving impaired pedestrians followed a similar pattern to that seen for impaired drivers.

The alcohol impairment levels were found to differ over the times of day of the crash. Those with an alcohol level above 0.3 were more likely than other groups to be involved in crashes at earlier times of day, with 53 per cent of their crashes occurring between 1200 hours and 1959 hours; this compared to 29 per cent of those with an alcohol level between 0.1 and 0.25 for the same time period. Approximately one third of all crashes involving a road user with an alcohol level between 0.1 and 0.25 occurred between the 0000 hours and 0400 hours.

3.2.2 Location of crash

The locations where crashes occurred were categorised into three groups: those occurring in the metropolitan area, those occurring in rural areas within a 100 kilometre radius of Adelaide and those occurring in rural areas greater than 100 kilometres of Adelaide. More than 56 per cent of the crashes involving a participant with an alcohol level above 0.05 occurred in the metropolitan area. This was particularly the case for pedestrians where it was found that more than 90 per cent of the impaired pedestrians were involved in a crash within the metropolitan area. A third of all impaired drivers and motorcycle riders had their crash in a rural area less than 100 kilometres from the metropolitan area. All alcohol impaired cyclists were involved in crashes within the metropolitan area.

The proximity of the crash location to the drivers' and motorcycle riders' home residence was reviewed for those crashes occurring in rural areas. More than 85 per cent of the drivers and motorcycle riders involved in crashes in both rural environments were found to reside within easy travelling distance from the location of their crash. The remaining 15 per cent of cases generally involved a driver or motorcycle rider who was known to reside in the Adelaide metropolitan area.

The locations of crashes for pedestrians involved in metropolitan crashes were categorised into three distinct areas: those occurring either in or in close proximity to the Central

Business District (CBD), those occurring on arterial roads and those occurring on minor local government roads. In more than 38 per cent of cases the pedestrian crash occurred in the CBD region. In two cases (4%) the pedestrian was involved in a crash on a local road, while all other metropolitan crashes involving an impaired pedestrian occurred on major arterial roads (58%). Crashes involving alcohol impaired pedestrians were more likely to have occurred in a midblock section of a roadway (64%) compared to intersection sites (36%). Pedestrian crashes occurring outside the CBD were reviewed for proximity of the crash to the pedestrians home residence. In all but five cases the pedestrian was found to reside within reasonable walking distance of the crash site. There were four crashes involving impaired pedestrians that occurred in rural areas; each of these occurred more than 100 kilometres from Adelaide. Three of these four crashes occurred in major regional towns. In each of these four crashes the pedestrian was known to live locally.

3.2.3 Types of crashes involving an impaired driver or motorcycle rider

Single vehicle crashes were the most common crash type seen among drivers and motorcycle riders impaired by alcohol, with more than 88 per cent of drivers and 55 per cent of motorcycle riders involved in single vehicle crashes. A collision between the vehicle and a fixed object was the most common crash type found for drivers, with more than two thirds being involved in this type of crash. The second most common crash type for drivers was a single vehicle rollover, accounting for 25 per cent of crashes involving impaired drivers. Impaired motorcycle riders were close to four times more likely to be involved in a multiple vehicle collision compared to impaired drivers. Single vehicle crashes among impaired motorcycle riders were equally distributed between striking a fixed object or losing control of the motorcycle and impacting with the road surface.

3.2.4 Circumstances surrounding crash involvement

The cases were reviewed for documented evidence that may shed light on the circumstances surrounding the drivers' or motorcycle riders' involvement in the crashes. This review included gathering information related to where the drinking took place and other information that might prove useful in understanding why the participant may have undertaken the driving task while impaired. In the large majority of cases there was limited information in the available data to draw any conclusions. The venue where the participant had been drinking prior to the crash was identified in only 16 cases; among these there were ten cases where the driver or motorcycle rider was known to be returning home after drinking in a pub or club. There were four cases where the participant was returning home from a party and one participant was known to have been returning home after drinking during the course of a dinner engagement. In four cases involving drivers, it was found that the driver had undertaken the driving task following an altercation with others. There were four other cases where the impaired driver or rider was known to be evading Police at the time of their crash. One important aspect identified in this review was the high incidence of non-restraint and helmet use among alcohol impaired drivers and riders.

3.2.5 Restraint and helmet use

Restraint and helmet use at the time of crash involvement was most commonly identified in South Australian Ambulance Services (SAAS) records documented at the crash scene. There were 36 drivers who were confirmed in these records as being unrestrained at the time of their crash, accounting for close to 20 per cent of all impaired drivers. In a further 16 cases, or 9 per cent, it was thought that a restraint was not used. In 58 cases (32%) the restraint use was unknown. As a comparison, the incidence of non-restraint use found amongst those drivers who were not impaired by alcohol was 3 per cent, thus alcohol impaired drivers were at least six times more likely to be unrestrained than other drivers. Seven motorcycle riders, or nearly 20 per cent of cases involving an alcohol impaired rider, were found to not be wearing a helmet at the time of the crash. Of those that were known to be wearing a helmet there was one case where the chin strap was found to have not been

secured. There was one other case where the helmet was found to have been thrown from the rider at the time of the crash, however, there was no further information in this case to determine whether the helmet had been appropriately secured. Among the 36 motorcycle riders there were eight cases where the use or non-use of a helmet was not known. Non-use of a helmet for those riders in the study not impaired by alcohol was considerably lower (less than 1%) than the incidence found in impaired riders. All three of the alcohol impaired cyclists were found to be wearing a bicycle helmet at the time of crash involvement.

3.2.6 Previous involvement in a crash as the result of alcohol impairment

The records related to the 274 alcohol impaired road users were reviewed for evidence of other alcohol related crash involvement. This review involved examination and linkage of the data found from three sources: the police records related to previous crashes, the DPTI licensing and infringement records and the Forensic Science records. The available data from the Forensic Science Centre was limited to the ten year period between 2000 and 2010. This review found 33 participants had been involved in at least one previous alcohol related crash, constituting more than 12 per cent of this group.

There were 26 impaired drivers and riders who were found to have been involved in at least one other crash as a result of alcohol impairment, with four of these participants having a history of two other alcohol related crashes. In 24 of these cases the driver or rider was found to be involved in a previous crash as a driver, while in the remaining two cases the driver was found to have been involved in a previous crash as a pedestrian. The specific levels of alcohol at the time of these previous crashes were noted in 17 cases while the remaining were identified as DUI (driving under the influence) only. In those where a specific alcohol concentration was known the concentrations ranged between 0.05 - 0.4gm/100ml, the majority being between 0.1 and 0.2gm/100ml.

Five pedestrians were found to have been involved in a previous crash as a pedestrian with one of these having been involved in three separate pedestrian crashes prior to the current crash. There was one pedestrian who had been involved in a previous alcohol related crash as a driver. One cyclist had also been involved in a crash as a driver in the months leading to this crash. In all but one of the previous alcohol related crashes for this group the participants blood alcohol concentrations (BAC) at the time of the crash were noted to be above 0.1gm/100ml, with most being within the range of 0.2 to 0.35gm/100ml.

3.3 Licensing characteristics of those who were alcohol impaired

3.3.1 Infringement history as the result of alcohol

Infringement histories for the 203 alcohol impaired drivers and motorcycle riders who held a South Australian licence were examined to determine the incidents of prior alcohol related offences among this group. A previous alcohol related offence was noted in 82 of these 203 licence holders, accruing 146 offences between them. Drivers were more likely than motorcycle riders to have had at least one alcohol infringement (39% of impaired drivers compared to 30.5% of impaired motorcycle riders). In 60 per cent of these cases the driver or rider had a history of one infringement each, however, there was one driver who was noted to have had nine previous alcohol infringements.

3.3.2 Previous disqualification periods among impaired drivers and motorcycle riders

The incidence of previous licence disqualification, for any reason, amongst impaired drivers and motorcycle riders was more than twice that of drivers and riders not impaired. More than 45 per cent of these licence holders had at least one disqualification prior to their involvement in this crash; this compares to 22 per cent for licence holders who were not impaired. A previous disqualification related to an alcohol offence was seen for 79 of the impaired drivers and riders, constituting 39 per cent of this group. In 90 cases the driver or rider had a period of disqualification as the result of demerit point loss for other offences; the most common

being related to speeding. A history that included both an alcohol related disqualification(s) and disqualifications for other reasons was commonly observed amongst impaired drivers and riders. In close to 65 per cent of cases this previous history of disqualification, for what ever reason, was limited to one occurrence. However, more than 10 per cent of the drivers and riders had a history of eight or more periods of disqualification, two of whom had been disqualified on 17 separate occasions.

3.3.3 Evidence of driving during periods of disqualification

The licensing records held by DPTI for the impaired drivers and motorcycle riders were reviewed for evidence of driving during periods of disqualification. This review is limited and does not necessarily reflect the true number of those who choose to drive whilst disqualified, but rather provides information for those who have been detected. There were eleven cases where a participant was found to be on a current licence disqualification at the time of being involved in the crash in this study, this group consisted of ten drivers and one motorcycle rider. In eight of these eleven cases the disqualification was in place as the result of a previous alcohol related offence while the remaining three had been disqualified for demerit point loss for other reasons.

In total there were 25 licence holders among the alcohol impaired group who had been detected driving during a period of disqualification on at least one occasion during their licensing history, constituting more than 12 per cent of this group of licence holders. In ten of these cases the licence holder had been detected driving during a period of disqualification on two or more occasions, one of whom had been detected driving on 17 separate occasions during one 12 month period of disqualification. In 40 per cent of cases the person detected as driving whilst disqualified was noted to be driving with an alcohol level of 0.05mg/100ml or above at the time of the detection, while the remaining 60 per cent of detections were not related to an alcohol offence.

The periods of disqualification varied among this group of 25 licence holders between six months and three years, with more than 60 per cent being disqualified for a six month period. The records related to these 25 licence holders were examined to determine whether there were any patterns related to when a driving whilst disqualified offence occurred; in particular: 1. were the licence holders more likely to drive during a more extensive period of disqualification? and 2. were they more likely to be driving toward the end of a disqualification period?. However, detections were found to have occurred across a broad time range and across all lengths of disqualification with no patterns observed. As an example, of the 15 licence holders who were undergoing a six month disqualification period there were three detected driving in each of the first three months of that disqualification. One participant was detected driving in the fourth month and there were five participants detected driving in the fifth month of the disqualification period.

3.3.4 Identification of alcohol dependence in licensing records

Licence holders who have a medical condition that has the potential to impact on driving performance are required to report that condition to the registration and licensing authority. Included among these conditions is alcohol dependence. There were 93 drivers and motorcycle riders in the study who were identified in the medical records as being alcohol dependent, however, this alcohol dependence status had been reported to the licensing authority in only one of these 93 cases.

4. Discussion and Summary

This paper has drawn together information from four discrete data sources related to road users involved in casualty crashes as a result of alcohol impairment. This linkage approach has provided a more holistic understanding of the multiple aspects surrounding the road users involvement in both the crash within the study and other alcohol impaired events;

including an understanding of their previous infringement, disqualification and crash histories. This multi-faceted approach has provided some insights into the characteristics found amongst alcohol impaired road users. In many instances the characteristics were found to differ between the different road user types, in particular the characteristics of pedestrians were often different than those seen for drivers and motorcycle riders. Some of the more important findings in this analysis will be discussed.

4.1 Age of impaired road users: Close to 80 per cent of all impaired road users involved in the crashes in the study were found to be between 20 and 49 years of age, however, the age distributions were found to vary between the different road user types. In particular, drivers were more likely to be between the ages of 20 and 39 years while more than half of all motorcyclists were between the ages of 40 and 49 years. Pedestrians were more broadly distributed across all age groups with the youngest pedestrian being 15 years of age and the oldest being 79 years.

4.2 Time of day and alcohol level: The majority (57%) of crashes involving an impaired road user occurred between 2000 hours and 0400 hours. The prevalence of crash involvement over the times of day were found to differ when the type of road user and levels of alcohol were isolated. Close to half of all impaired motorcycle riders were involved in a crash between 1600 hours and 2000 hours, more than twice as prevalent at this time of day when compared to impaired drivers. Crashes involving a road user with higher levels of alcohol were also found to be more prevalent at earlier times of the day with more than 50 per cent of the road users with an alcohol level above 0.3 found to have been involved in a crash between 1200 hours and 1945 hours, compared to less than 30 per cent of road users who had an alcohol level of less than 0.25.

4.3 Pedestrians: More than 90 per cent of the impaired pedestrians were involved in a crash within the metropolitan area, with most occurring on major arterial roads and at midblock locations. More than 43 per cent of all impaired pedestrians were found to be Indigenous Australians. Pedestrians were found to be the road user type most likely to be impaired as the result of alcohol at the time of their crash; with more than 25 per cent of pedestrians in the study found to be impaired as the result of alcohol compared to 21.5 per cent of drivers and less than 10 per cent of motorcycle riders. Given that only 50 per cent of pedestrians underwent mandatory testing for alcohol, this figure is expected to be conservative. Of the pedestrians that were tested for alcohol it was found that more than 55% had an alcohol reading that was 0.05 or more. Pedestrians were also more likely than other road user types to have higher alcohol levels; for example more than 54 per cent of the impaired pedestrian group had an alcohol level that was greater than 0.2, 17 per cent of whom had an alcohol level greater than 0.3. This compares with drivers where 27 per cent were found to have an alcohol level greater than 0.2, only 3 per cent of whom had a level above 0.3.

4.4 Drivers and motorcycle riders: Close to 90 per cent of all impaired drivers and motorcycle riders were found to have an alcohol level that was above 0.1, with the majority (55%) found to have an alcohol level between 0.1 and 0.199. Crashes involving impaired drivers and motorcycle riders occurred in all three location categories. Drivers and riders were generally found to live within a reasonable travelling distance from where their crashes occurred. Single vehicle crashes were the most common crash type seen for both road user types but this was particularly the case for drivers, where 88 per cent of their crashes were single vehicle crashes that involved striking a fixed object or a single vehicle rollover. Non-restraint or non-helmet use was a common feature of crashes involving impaired drivers and motorcycle riders with close to 20 per cent found to not be wearing a restraint or helmet at the time of the crash; this compares with 3 per cent of drivers and less than 1 per cent of motorcycle riders who were not impaired by alcohol.

4.5 Indigenous Australians: Indigenous Australians were over-represented among alcohol impaired road users, with more than 54 per cent of all participants identified as Indigenous Australians found to be impaired at the time of the crash. While Indigenous Australians made up 3 per cent of those crash involved participants in the study overall, they were found to be involved in more than 9 per cent of all crashes involving an impaired road user. The involvement of alcohol in the crash for Indigenous road users was particularly noted amongst the pedestrian group where 15 of the 23 pedestrians who were identified as being Indigenous found to have an alcohol reading above 0.05.

4.6 Alcohol dependence: Alcohol dependence was identified as a pre-existing condition for 146 of the road users, representing close to 10 per cent of all participants in the study; this compares with the national average of 3.5 per cent [Slade (2009)]. Half of the participants identified as being alcohol dependent were found to be impaired as the result of alcohol at the time of the crash. Those impaired road users who were identified as being alcohol dependent were more likely than other impaired road users to have a alcohol level within the higher limits, with more than 40 per cent of the group identified as alcohol dependent found to have an alcohol level that was 0.3 or above.

4.7 Previous evidence of impairment in crashes and infringements: Close to 40 per cent of the impaired drivers and motorcycle riders were found to have had at least one previous infringement related to a drink driving offence. In the majority of these cases (60%), the participants previous drink driving offence history was limited to one offence, however, 20 per cent had an alcohol offence rate that included three or more previous alcohol related infringements, one of whom had nine. There were 33 impaired road users who were identified as being involved in at least one previously reported crash where alcohol was identified as a contributing factor, constituting more than 12 per cent of this group. Among them were four drivers and riders who had been involved in two previous alcohol related crashes and one pedestrian who was known to have been involved in an alcohol related crash as a pedestrian on three separate occasions.

4.8 Previous licence disqualifications and compliance: Licenced drivers and riders who were known to be impaired by alcohol were found to be twice as likely to have had a previous period of licence disqualification than those licence holders that were not impaired. These disqualification periods were noted to be as a result of an alcohol offence or as the result of demerit point loss. Multiple disqualifications that occurred as the result of both an alcohol offence and as the result of demerit point loss unrelated to alcohol were frequently observed in this group. Determining compliance to an imposed disqualification period is difficult. However, it was noted that 12 per cent of the impaired participants had been detected driving whilst undergoing a licence disqualification period on at least one occasion, including eleven drivers and riders who were identified as being disqualified from driving at the time of involvement in this crash. Detections for driving whilst disqualified were noted across all lengths of disqualification periods with no pattern detected.

4.9 Further countermeasure potentials: The data presented here has the potential to inform those in the road safety community seeking to develop further targeted countermeasures. Some of the possible countermeasures that may be considered include earlier movement into an Alcohol Interlock Scheme, reduced periods of licence disqualification, and increased communication between medical personnel and licensing authorities.

Alcohol Interlock Schemes have been or are being implemented across most jurisdictions in Australia and elsewhere. In most of these jurisdictions a person is eligible to enter the interlock schemes following two or more alcohol related offences, or those first time offenders detected driving with very high alcohol readings; these are initiated following a period of licence disqualification. Given the number of impaired licence holders in this study who were

repeat offenders it is at least beneficial to promote the debate surrounding implementation of interlock schemes for all first time alcohol offenders. The evidence within this study suggest that some licence holders are prepared to continue driving during periods of disqualification. There is at least the potential that those who breach the penalty may become accustomed to and accepting of the risks related to driving whilst disqualified and continue to do so rather than regaining a licence with interlock restrictions. Debate surrounding direct movement into an interlock program without a period of disqualification has the potential to minimise the risks posed by these licence holders who, without an interlock fitted, may continue to pose a road safety risk.

Of the 93 licence holders who were known to medical authorities as being alcohol dependent only one had that status documented in their licensing records. While it is the licence holders responsibility to report medical issues that impact on driving to the licencing authority it appears that this group may be a sub-set of people less likely to do so. It is suggested that there needs to be a greater promotion of the road safety risks posed by those with alcohol dependence to the medical practitioners responsible for their care and to encourage medical practitioners to take a more active role in directly reporting their patients' dependence status to the licensing authority.

6. Study limitations

The identification of those involved in a crash as the result of alcohol impairment relied heavily on the objective BAC data that was sourced from the South Australian Forensic Science Centre. During the data collection process it was found that 50 per cent of the pedestrian group were unable to be matched with this source. As pedestrians were more likely than other road users to be both alcohol dependent and to be alcohol impaired, this missing data is likely to have resulted in an under-representation of the prevalence of alcohol impairment, particularly amongst pedestrians.

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