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Research paper

Alcohol-related serious road traffic injuries between 2000 and 2010: A new perspective to deal with administrative data in Australia

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ABSTRACT

Background: According to the most recent statistics from the World Health Organization, 1.2 million people die or are injured on the world's roads every year. Drink-driving continues to be a major risk factor for road traffic crashes, with 22% of serious road injuries (SRIs) in Victoria involving a blood alcohol concentration (BAC) equal to or above the legal driving limit of 0.05 g/mL. Use of police and hospital data to determine alcohol involvement in SRIs is not reliable, with researchers using proxy measures such as high alcohol hours (HAH). This paper examines patterns of alcohol-related SRIs based on reported BAC versus the surrogate HAH measure.

Methods: Trends over a 10 year period (2000–2010) were examined, comparing four different SRI rates (low alcohol hours (LAH), LAH with positive BAC, HAH, HAH with positive BAC). Discontinuities in the data series were also examined. SRI data were drawn from the Road Networks Database of VicRoads containing information on all reported road crashes in Victoria.

Results: For the 10 year period there were 52,286 reported SRIs relating to the driver. Of the incidents where a driver's reading was recorded, 44% had a recorded BAC exceeding Victoria's legal limit of 0.05% and a further 23% had a BAC below the legal limit. During the period over 17,000 (or 34%) SRIs occurred during HAH. Where a BAC had been recorded during HAH, almost 60% exceeded the legal limit and a further 20% had some positive recording of BAC. Where SRI drivers had a recorded BAC during LAH, 58% had a positive BAC (31% with a BAC over the legal limit). While it is likely that an SRI occurring during HAH will be associated with a positive BAC (80%), of which 60% will be above the legal limit, almost 60% of SRIs during LAH had a positive BAC, with 31% above the legal limit.

Conclusion: There was no significant change in overall alcohol-related SRI rates between 2000 and 2010, suggesting that policies and procedures implemented to decrease drink-driving have not reduced alcohol-related SRI rates. In the absence of a reliable direct measure (i.e., BAC readings) this paper demonstrated the utility of the surrogate HAH measure for determining changes in alcohol-related serious road injuries. Further, the unmet need for routine BAC testing in SRIs occurring during LAH requires further exploration given the significant proportion of SRIs involving positive BAC during these times.

Introduction

According to recent statistics provided by the World Health Organization (WHO; World Health Organization, 2015), 1.2 million people die annually on the world's roads, and an additional 20–50 million people sustain nonfatal injuries. Although the frequency of drinking and driving varies between countries, universally drink-driving remains a major risk factor for road traffic crashes (World Health Organization, 2004). Statistics from the National Highway Traffic Safety Administration in the United States estimate that in 2010 there were just over 10,000 alcohol-related traffic fatalities; one every 48 min. Of all fatal traffic crashes, alcohol-impaired drivers account for 31% (National Highway Traffic Safety Administration, 2012). By comparison, in

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Australia it is estimated that 420 of the 1400 annual fatal crashes (or 30%) are caused by alcohol-impaired drivers (Australian Transport Council, 2011). In both countries, relative to population size, it is estimated that 1 in 3 traffic fatalities are due to an alcohol-impaired driver. As such, in the United States, Australia and other alcohol-tolerant countries, it is not surprising that alcohol impairment of drivers is considered the most important single contributing cause of car crash injuries (Connor, Norton, Ameratunga, & Jackson, 2004).

While there appears to be no standard definition of a serious road traffic injury (SRI) (Chikritzhs; see European Commission, 2013; International Traffic Safety Data and Analysis Group, 2011), many countries, including Australia, combine hospitalised and fatal road crash victims data when reporting SRIs for road safety statistics (Chikritzhs, Stockwell, Heale, Dietze, & Webb, 2000a). In Australia, the most recent SRI statistics suggest 94 people die or are seriously injured every day; that is, there are almost 34,000 SRI incidents per year (Australian Transport Council, 2011). This report estimates that almost 10% of SRI incidents were the result of drink-driving. In Victoria, results from the latest Drug Statistics Handbook (Heilbronn, Killian, & Lloyd, 2013) indicates that there were 4740 SRIs sustained by Victorian drivers (or riders), of which 1040 (or 22%) had breath alcohol concentration (BAC) readings at or exceeding the Australian legal limit of 0.05 (5 mg/100 mL).

It is important to note that the difference between the percentage of SRIs for all of Australia and that for Victoria is most likely attributable to the reporting and recording procedures managed across different Australian states and territories. For example, the Australian Institute of Health and Welfare report titled "Trends in serious injuries due to land transport accidents, (Australian Institute of Health and Welfare, 2012) indicates that some reporting bodies focus only on crashes on public roads yet others report on crashes on and off public roads. The report also notes that counts of SRIs in some reports exclude "same-day separations" from hospitals while other reports include both same-day and longer-stay separations. Furthermore, it has been reported that the blood alcohol concentration (BAC) of drivers or riders involved in SRI crashes is not routinely recorded by Australian police (Chikritzhs, Stockwell, Heale, Dietze, & Webb, 2000b; Stevenson & Ridolfo, 2001). This is because police, in most jurisdictions, do not attend all road traffic crashes and therefore do not take BAC samples. For example, according to VicRoads, the road and traffic authority in the Victoria, "if anyone is injured and the police are not at the crash, you must report the crash to the nearest police station" (VicRoads, 2014). In such circumstances, the BAC of drivers or riders associated with a crash, may never be known. However, in many jurisdictions across Australia, where a person presents to an emergency department, as a consequence of a traffic crash, it is mandatory for medical staff to take blood for the purpose of drug analysis (includes alcohol) from individuals involved in traffic crashes (see for example Jarred, 2002; NSW Government, 2005; Transport Accident Commission, 2006). While coroner's records do provide BAC data for about 80% of fatally injured drivers (Chikritzhs et al., 2000b), Stevenson and Ridolfo (2001) suggest that across Australia the BAC data for police-reported hospitalisations (or SRIs) were incomplete for 55% of crashes.

Relying solely on police and hospital administrative data to examine the role of alcohol in SRIs is flawed. In Victoria, this is exacerbated by recent changes to reporting and recording systems of road crashes and the definition of what constitutes an SRI. Victoria Police are responsible for collecting and recording all injury collisions that occur on Victorian roads (Victoria Police, 2013). Prior to 2009, Victoria Police regarded a person as having a serious injury (resulting from a traffic crash) if that person was transported to hospital. In January 2009, this definition changed to being (1) A person is taken to hospital and admitted, or (2) Taken to hospital but an enquiry into the admission status of the person is still pending (see personal communication from the Victoria Deputy Commissioner, Parliament of Victoria, 2012; Victoria Police, 2013). According to Victoria Police, the majority of the road traffic crashes resulting in a serious injury "enquiry pending" (option 2 above) are typically classified as "not admitted" to hospital and therefore reclassified from being a serious injury.

Furthermore, in December 2005, Victoria Police introduced a new data collection system (Traffic Incident System, TIS) to record details of road crashes. Prior to December 2005 Victoria Police did not have a specific application to store and record crash data. While the definition of SRIs remains consistent across the two reporting systems, Victoria Police advise that, as a discontinuity in the data series has occurred, data from 2006 onwards are not comparable to data from previous years and as such warning against undertaking time series trend analysis that draws on data spanning the two periods (see warning advice, VicRoads, 2013). In the absence of a sound and reliable administrative data set to examine the extent of alcohol's involvement in particular settings or experiences, researchers have typically generated proxy measures – one of these being *high alcohol hours.*

High alcohol hours

High alcohol hours (HAH) relate to the time of day and the day of week in which alcohol consumption is considered to be greatest and a likely a contributor to the outcome of interest. HAH as a surrogate measure has been used across a broad spectrum of Australian research where blood alcohol concentration (BAC) or breath alcohol concentration measures are not readily available. It has been used in relation to assaults (Cassell, Reid, Clapperton, Houy-Prang, & Kerr, 2011; Miller, McDonald, McKenzie, O'Brien, & Staiger, 2013), alcohol outlet density (Livingston, 2008), alcohol-related harm in the night time economy (Miller, Tindall et al., 2012) and pedestrian safety (Archer, Candappa, & Corben, 2008), as well as road crashes (Chikritzhs et al., 2000b; Dietze et al., 1999; Miller, Coomber, Sonderlund, & McKenzie, 2012; Rumbold et al., 1998; Tay, 2005). With respect to road crashes, HAH is the time in which a road traffic crash is presumed to be alcohol-related.

In Victoria, road safety research has drawn on the surrogate measures initially developed by Sloane and South (1985) and later modified by Harrison and others (Harrison, 1986, 1990), who demonstrated that the distribution of alcohol-related traffic crashes is not uniform over time and days. As a result of this research, a surrogate or proxy measure of alcohol's involvement in road traffic crashes was constructed. Harrison used a person-based approach of all drivers who had been killed or admitted to hospital as a result of a road traffic crash (differing to Sloane's crash-based approach). Using the BAC of these drivers and the reported crash time, alcohol times (or HAH) were defined as those time-periods where the proportion of drink drivers (those with a positive BAC) was greater than 0.15 (or 15%). This 15% cut-off was based on the earlier work of South (1988). A seven-day window was divided into

Table 1
Victorian high alcohol hours – where the proportion of SRI drivers with a BAC reading of 0.05 g/ml or higher was at least 15%.

Harrison (1990)				
Sunday	16:00	to	Monday	06:00
Monday	18:00	to	Tuesday	06:00
Tuesday	18:00	to	Wednesday	06:00
Wednesday	18:00	to	Thursday	06:00
Thursday	18:00	to	Friday	06:00
Friday	16:00	to	Saturday	08:00
Saturday	14:00	to	Sunday	10:00