



Research paper

The effect of short-term alcohol restriction on risk of alcohol-related injury: A state wide population-based study



Wenbin Liang^{*}, William Gilmore, Tanya Chikritzhs

National Drug Research Institute, Curtin University, Perth, WA, Australia

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ABSTRACT

Background: Alcohol consumption and related harms are largely determined by both demand and supply of alcohol. Across Western Australia, under state licensing laws, there are state-wide alcohol sales restrictions imposed on Good Friday and Christmas Day each year. This study aimed to evaluate the effect of the Good Friday and Christmas Day state-wide alcohol restrictions on the risk of alcohol-related injuries presenting at emergency departments.

Methods: This is a population-based cohort study using ED injury presentation data for the period 1st January 2002 to 1st January 2015. Risk of injury during the alcohol-related time of day affected by the alcohol restrictions (intervention periods, including Good Friday and Christmas Day) were compared to the same time of day over a number of control days. Multivariable Poisson regression model was used to perform the analysis.

Results: The crude injury risk was considerably lower during the alcohol restriction periods compared to control periods in both metropolitan and non-metropolitan areas. The protective effect observed on the days of the alcohol restrictions remained significant, and largely unchanged, when potential confounding effects were controlled for.

Conclusion: The significant reduction in alcohol-related injury presentations observed for public holiday periods with alcohol restrictions were likely caused by the alcohol restriction policy and its direct effect on alcohol supply.

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Introduction

Alcohol use is one of the major risk factors for premature mortality and morbidity worldwide (Lim et al., 2012), which is estimated to account for 5.1% of the global burden of disease in Disability Adjusted Life Years (DALYs) and 5.9% of the global burden in mortality. This equates to approximately 139 million years of healthy life lost through premature death and disability and 3.3 million deaths. Injuries, both intentional and unintentional, are the leading cause of alcohol-attributable DALYs and the second leading cause of alcohol-attributable mortality (World Health Organization, 2014).

It is clear that levels of alcohol consumption and related harms are a function of both demand and supply (availability). It is possible therefore to reduce alcohol use and alcohol-related harm

through supply-based legislation and policy (Margolis et al., 2007; National Drug Research Institute, 2007; Treno et al., 2013). One well established approach to reducing supply is to restrict the hours and days that alcohol can be purchased. Many studies (Briscoe & Donnelly, 2001; Chikritzhs & Stockwell, 2002, 2006; Smith, 1983, 1988) and several reviews (Babor et al., 2010; Stockwell & Chikritzhs, 2009) have investigated the impact of restriction or extension of trading hours on local communities showing a positive correlation between trading hours and alcohol consumption and harms, nevertheless, there has been limited focus on the effect of large-scale alcohol restriction on large populations.

Across Western Australia, under state licensing laws (Liquor Control Act 1988), there are mandatory state-wide alcohol sale and supply restrictions imposed on Good Friday and Christmas Day each year. These restrictions have been in place for at least 30 years and pre-date the 1988 Liquor Control Act; they are likely to have been originally predicated on Christian religious observance. In Western Australia (WA), hotels, taverns and bars (both days – 12 noon to 10 pm), restaurants (both days – no restriction on hours) and social clubs (Christmas Day – 12 noon to 10 pm) may

^{*} Corresponding author at: National Drug Research Institute, Curtin University, GPO Box U1987, Perth, WA 6845, Australia. Tel.: +61 8 9266 1617; fax: +61 8 9266 1611.

E-mail address: w.liang@curtin.edu.au (W. Liang).

open for business on these days, and may only sell alcohol if it is served alongside a meal (Department of Racing Gaming and Liquor Western Australia, 2009). For the remaining outlets, including liquor stores, nightclubs (not permitted since 3 am both days, i.e. close of business of the previous night) and the remaining hours, closure is mandatory. This creates a setting for examining the effects of short-term alcohol restriction on alcohol-related harm among the population of an entire state.

These short-term restrictions are likely to impact on acute consequences of alcohol use, such as alcohol-related injury. Alcohol-related injuries are responsible for a large portion of alcohol-related harm (WHO Collaborative Study Group on Alcohol and Injuries, 2007), and it has been estimated that one in seven patients attending emergency departments (EDs) in Australia (one in five in WA) are alcohol-related cases (Egerton-Warburton et al., 2014). Among injury-related presentations specifically, the proportion due to alcohol has been estimated to be almost one in three in Australia (Chikritzhs et al., 2011; Poynton et al., 2005). This study, therefore, aimed to investigate the effect of the WA state-wide alcohol restrictions on Good Friday and Christmas Day on the risk of alcohol-related injuries presenting at EDs.

Method

This is a population-based cohort study using ED injury presentation data for the period 1st January 2002 to 1st January 2015. Risk of injury during the alcohol-related time periods affected by the alcohol restrictions (intervention periods, including Good Friday and Christmas Day) were compared to the same time periods over a number of control days (details listed below). Alcohol-related times of day were defined as from 10:00 pm to 3:59 am of the next morning. These are times of day when acute alcohol consumption and its intoxicating effects are common in the general population (Liang & Chikritzhs, 2015) and are in keeping with definitions of alcohol-related times of day adopted in other injury studies (Heeren et al., 1985; Treno & Holder, 1997; Voas et al., 2009; Young et al., 2004).

Intervention and control periods were therefore specifically operationalised as follows (the dates in 2014 are used as examples). The intervention period from 10:00 pm on Good Friday night (18/04/2014) to 3:59 am the next morning (19/04/2014) was compared to: (i) 10:00 pm on the following Saturday night (19/04/2014) to 3:59 am the next morning (20/04/2014); (ii) 10:00 pm on the Fridays of the previous (11/04/2014) and following weeks (25/04/2014) to 3:59 am the next mornings (12/04/2014 and 26/04/2014); (iii) 10:00 pm on the Saturdays of the previous (12/04/2014) and following weeks (26/04/2014) to 3:59 am the next mornings (13/04/2014 and 27/04/2014) (see Fig. 1). Similarly, the intervention period from 10:00 pm on Christmas day (25/12/2014) to 3:59 am on Boxing Day (26/12/2014) was compared to: (i) 10:00 pm on the Friday of the previous week (19/12/2014) to 3:59 am the next morning (20/12/2014); (ii) 10:00 pm on the Saturday of the previous week (20/12/2014) to 3:59 am the next morning (21/12/2014); (iii) 10:00 pm on New Year's Eve (31/12/2014) to 3:59 am on New Year's Day (01/1/2015) (there is no alcohol restriction applied on New Year's Eve).

Data on injury related ED presentations to public hospitals in Western Australia (WA) were provided by the WA Department of Health. Injury cases were defined based on the criteria developed by the WA Department of Health including: (i) all cases presenting to metropolitan EDs with an “injury” related principal diagnosis including ICD-10-AM codes S00 to T35; these codes are commonly referred to in the literature as S & T codes and designate the underlying cause of presentation as an “injury”; and (ii) all cases presenting to non-metropolitan EDs with an injury-related Major Diagnostic Category (i.e. injuries, poisonings toxic effects of drugs and burns), injury-related symptoms/presenting problems (i.e. “dislocations of the lower limbs”, “fractures of upper limbs”), and/or presence of External Cause of Injury (i.e. “fall”, “transport events”).

Data analysis

Poisson regression models were employed to compare risk of injuries during the two intervention periods (Good Friday and Christmas Day) and their control days. Within the short time interval separating intervention and control periods, the size of the population as well as its distribution in terms of age, gender and socioeconomic status, were likely to have remain unchanged. Therefore, no confounding effects would be introduced by demographic factors given that calendar year was adjusted for in the model. However, in order to be conservative, estimates from Poisson regression models that controlled for only calendar year and locations of emergency departments where injuries presented (i.e. metropolitan/non-metropolitan) were compared to estimates from Poisson regression models that also controlled for age and gender. A newly developed proxy outcome method (Liang & Chikritzhs, 2013a, 2013b; Liang et al., 2014; Tchetgen Tchetgen, 2014) was further employed to account for unobserved residual confounding effects – any residual confounding effect (i.e. holiday related activities) that may have affected the day-specific base incidence rates of injury. This is because it is likely that each particular day analysed in this study is qualitatively different from other days in some way, and some of these differences may cause bias. For example, let RR_{bias} represent the risk difference between Good Friday and its control days that is caused by day-specific factors rather than alcohol-restriction. Assuming that the effect of RR_{bias} does not vary by time of day, RR_{bias} can then be approximately measured by the day-specific injury risk ratio: the whole day injury incidence rate on a control day divided by the whole day injury incidence rate on Good Friday. To address this potential for bias, when estimating the effects of alcohol restriction, RR_{bias} was offset in the analysis by subtracting an estimate of the size of this bias from the observed effect of the intervention. This study also included additional sensitivity analysis by using a random sample of all ED admissions as a control series. Because the alcohol restriction will have much smaller effects on the control series than on the injury series (which are much more commonly alcohol related), a comparison of the risk variations for alcohol restriction days and control days between the injury series and the control series indicates whether any apparent trend in the injury series is likely due to confounding

Fri	Sat	Sun	Mon-Turs	Good Friday	Sat	Sun	Mon-Turs	Fri	Sat	Sun
	-3:59 am	-3:59 am			-3:59am	-3:59am			-3:59am	-3:59am
10pm-	10 pm-			10 pm-	10pm-			10pm-	10pm-	

Intervention period	Control Period
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Fig. 1. Intervention period and control period for Good Friday.

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