

## Research Paper

## Crisis support services in night-time entertainment districts: Changes in demand following changes in alcohol legislation

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## ABSTRACT

**Background:** Night time entertainment districts (NEDs) are predominantly frequented by youth who drink alcohol before and after entry. Centres where people binge drink alcohol make use of emergency services at a greater rate than those places where alcohol is not present. Previous UK government research suggests that lengthening the hours for alcohol sales has led to a spreading of emergency service use across the night, with services required later in the night. In Queensland, the State Government has introduced more restrictive opening hours for alcohol sales in NEDs and we predicted earlier use of crisis services and, with a large preloading culture, similar or more service use.

**Methods:** Volunteer organisations, such as the NightWatch in Brisbane, Australia, provide crisis interventions as required in these NEDs and so we used the data from their records. Every Intervention made by the NightWatch organisation is recorded in an electronic database. We analysed data, matched for time of year, by looking at a 6 month period before the new legislation and a matching 6 month period following legislation.

**Findings:** Following restrictive alcohol sales, the NightWatch provided similar numbers of interventions but those that required a more involved intervention (e.g., Rest and Recovery in a shelter) were significantly more prevalent, while less involved interventions (e.g., Intoxication First Aid provided in situ on the street) were fewer. Consistent with both preloading research and research into hours of alcohol availability, it was found that the NightWatch provided their services to the same number of people as before the legislative change, but provided them earlier in the evening.

**Interpretation:** Where there is a preloading culture, restricting alcohol sales at the end of the night appears to lead to an increased use of crisis interventions earlier in the evening. A compressed need for aid runs the risk of overloading crisis service availability unless these services are proportionately resourced.

## Presence of problem

Alcohol and substance consumption has become a highly publicised social event that often leads to health and economic costs. With preloading (pre-drinking) evident in approximately 80% of the patrons entering night time entertainment districts (NEDs; Devilly, Allen, & Brown, 2017) and the co-consumption of other drugs when drinking heavily on a night out (Miller, Byrnes, Branner, Johnson, & Voas, 2013), more research studies into the effects of youth drinking are needed. While trends recently observed by the Australian Bureau of Statistics (2015) have shown a reduction in hazardous drinking levels compared to 2012, they still identified that between the financial year of 2014 and 2015, approximately 44% of Australians over the age of 18 reportedly consumed more than four standard drinks in one single

occasion. The National Health and Medical Research Council (2009) state that the consumption of four or more drinks on any one day has been identified as a risk factor for short term harm, while 28 or more standard drinks per week is a risk factor for long term harm. This has been recently reinforced by a major review finding a linear relationship between alcohol consumption and major health risks, even above just 100 g per week (i.e., 1 drink per day; Wood, Kaptoge, & Butterworth, 2018). The results of these harms have been highlighted previously within the research literature to include numerous health conditions (World Health Organization, 2014) inclusive of mental health conditions, such as depression (Wang & Patten, 2001), as well as an increased likelihood of injury and lower life expectancy (Centers for Disease Control & Prevention, 2016).

These harms not only provide costs to the individual but also to the

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community. For the financial year of 2004 to 2005, Collins and Lapsley (2008) estimated the total cost of alcohol use (defined as the total value of net resources which cannot be used for the Australian community due to the results of current and previous drug abuse) to be \$15.3 billion. Of this, approximately \$1.6 billion was attributed to policing and the criminal justice system. Another \$1.98 billion was attributed to health care costs such as hospitals and ambulance services, while an additional \$2.2 billion of this total was absorbed by road accident costs. Thus, alcohol contributed to 49.5% of the gross health care costs from the total drug, tobacco and alcohol consumption during the 2004 to 2005 financial year period. These estimations highlighted the large demands for emergency services over an extended time period, indicating a need for assistance from and towards these services.

### Preloading

A complicating factor to alcohol use within NEDs is the issue of preloading. The behaviour known as preloading has been defined in the past as the consumption of alcohol at a private residence prior to the attendance of licensed venues during which further alcohol is consumed (Foster & Ferguson, 2014). However, recent research demonstrates that drinking in suburban pubs before entry into the entertainment districts of large cities leads to the same intoxication level as people drinking in private residences (Deville et al., 2017) and preloading is seen as drinking before entry into these entertainment districts. Preloading within the NED is unlikely to be a major factor in Queensland, where consuming alcohol in a public place is illegal and visibly enforced by the police. Previous research into preloading have revealed that individuals are consuming from 7 to 30 standard drinks prior to entrance into a licensed premise (Barton & Husk, 2012; Grant & Terry, 2017; Hughes, Anderson, Morleo, & Bellis, 2007) and begin the preloading process as early as 7 pm (Barton & Husk, 2012). MacLean et al. (2014) have indicated that individuals, in particular youths (aged 18 to 24), frequently choose to consume alcohol prior to attending licensed premises as it is more cost efficient.

A study conducted by Devilly et al. (2017) involved the breath testing and administration of questionnaires to 2751 people entering a Brisbane entertainment precinct to collect data based on alcohol consumption and antisocial behaviours. Of the participants reporting to engage in preloading prior to entering the precinct, the average breath approximated blood alcohol concentration (BrAC) was 0.058. Further, 71% of participants produced a BrAC over zero, with the overall average BrAC being 0.071. To put this into context, a BrAC above 0.05 prevents an individual from legally being able to operate a motor vehicle (Queensland Government, 2017a). While Devilly et al. (2017) observed that males were more likely than females to produce higher BrACs, more worryingly was the high ranges that people obtained even before entry to the NED. In particular, 23.56% of those pre-drinking scored a BrAC above .10 g/100 ml and 5.65% obtained a BrAC score of .15 or above – a level three times the driving limit and one commonly associated with vomiting and severe impairment of judgement, perception and motor control (National Institute on Alcohol Abuse & Alcoholism, 2015). Such physiological reactions lead to an increased need for emergency first aid.

### The NightWatch programme

Street patrols conducted by interdenominational Christian volunteers within entertainment precincts have been occurring since 2003 (Johns, Squire, & Barton, 2009). These patrols involve the increased visibility of organisations engaging in current social issues and the provision of care by volunteers to individuals in need. Middleton and Yarwood (2015) argue that the aim of this service is to fill the gaps in which Emergency Services are unable to attend. These volunteers provide services such as first aid and support for individuals within entertainment precincts in a caring and non-judgemental manner

(Middleton & Yarwood, 2015). Similar support services have been introduced in Queensland entertainment precincts. In the NEDs of Brisbane CBD, Brisbane Inner West and Fortitude Valley the not-for-profit charity organisation 'NightWatch' is the designated support service. As described by the Queensland Government (2017), NightWatch provides an assertive outreach through patrols within the NED during the night as well as a Rest and Recovery service within their 'NightSafe' intervention. Together we refer to this programme as NightWatch and define it as a service providing relevant interventions to people in need within the NED. NightWatch describe their service as moving through the NEDs in the search for individuals in crisis, offering services such as first aid, problem solving, exit strategies and care and support. Overall, these services aim to provide proactive patrols of the area, fast responses for consumers and stake holders, as well as problem solving and intervention. Being an acute intervention service, and being a faith-based organisation, it should be noted that the volunteers have no single faith (if at all) and the services offered do not include proselytisation.

### Legislative changes & intentions

In 2011, the Queensland Government estimated that approximately 50,000 people enter the Fortitude Valley NED every Friday and Saturday night (Queensland Government, 2011). Although not all of these individuals enter the described 73 licensed premises (current as of 2011), it is estimated that a large proportion of these people are engaging in alcohol related activities within these venues. Tindall et al. (2016) state that alcohol selling venues are generally concentrated in entertainment precincts such as these and are often found to have higher levels of crime. As such, areas like Fortitude Valley have been designated as Safe Night Precincts (SNP) within Queensland legislation. The concept of the SNP was introduced in Queensland's *Liquor Act, 1992* and aimed to inform and involve not only patrons of the precinct but other key players such as the local community and venue licensees. The legislated purpose of a designated SNP is to reduce the use and misuse of alcohol and drugs by individuals within the area. In doing so it is expected that this will also reduce the violence associated with, and resulting from, the described substance use, while also minimising the disturbances to public order (*Liquor Act, 1992*). Fifteen areas within the state of Queensland are designated as SNPs including Brisbane Central Business District, Surfers Paradise on the Gold Coast, and the focus of this research: Fortitude Valley. To be consistent with other literature, these SNPs will from here on be referred by the term Night-time Entertainment Districts (NEDs).

During July 2016, the *Tackling Alcohol-Fueled Violence Legislation Amendment Act, 2016* (Qld) was implemented in extension of the *Liquor Act (1992)*. This legislation requires licensed venues within the NED to cease service of rapid intoxication beverages by midnight and all alcohol service by 3a.m., two hours earlier than the previous 5a.m. requirement. This 3a.m. cessation may be extended to 5a.m. if the licensee has obtained an extended trading permit, however, this can only be achieved up to six times per year (Queensland Government, 2017b). The legislation, as it is titled, aims to target the violence and injury occurring from excessive alcohol consumption as described by the NHMRC (2009) and World Health Organisation (2016) during high alcohol hours.

### Previous legislative change

On the 24th November 2005 the UK introduced a new licensing act which allowed for 24 h drinking licences for certain outlets under certain circumstances. In effect, this UK policy was in the opposite direction to the new Queensland policy and should be instructive. In 2008, a UK government report (DCMS, 2008) on the effect of the new policy noted no increases in violence (as with Australia, the UK violent crime figures were reducing before introduction of the legislation). However,

it was noted that emergency service requirements were spread further across the night. Although still an early evaluation, it was noted in the report that “some areas report improvements in dispersal from licensed premises because flexible opening hours have helped to smooth the peaks of trouble” and “while there has been a small fall in serious violent crimes, the impact on overall crime levels appears to be limited, with evidence of some displacement into the small hours” (p.8, DCMS, 2008). This outcome does imply that emergency services are not all required at the same time (11.30pm for pub and 2.30am for club closing hours). A legislative change in the opposite direction, as introduced in Queensland, acts as a crucible through which we may test this early review by the UK government into their legislative change. If this is a correct finding that translates to Australia, we would expect a clustering of service requirements into the hours around where people enter NEDs (due to a possible increase in preloading) and when they are asked to leave premises as they stop selling alcohol and likely close their doors (DCMS, 2008).

### Hypotheses & current study

In this study we assessed the service requirements of the NightWatch for the same 6 months (July – December) from before and again after the legislative change. Specifically, we hypothesised that: 1. With the limitation of alcohol availability within NEDs, as of the legislative implementation and a large preloading culture, it is predicted that interventions will occur earlier in the evening in 2016 when compared to 2015; 2. As individuals may be entering the NED intoxicated (due to preloading) and the total amount of time to purchase alcohol within NEDs has decreased, it is predicted that any differences identified in the total number of interventions over the two time periods will be trivial. 3. It is further predicted that there will be no difference in the total number of people involved in interventions over the two time periods.

### Method

#### Participants

To realistically test the research hypotheses a power analysis was conducted to ensure feasibility of data extraction while preventing any over-testing. As the aim of this study is to identify changes in interventions over two time periods, power was based on total number of data collection days rather than total number of participants. To conduct chi square analyses with 2° of freedom and a power of 0.8, a total of 108 days of data collection would be required (Faul, Erdfelder, Lang, & Buchner, 2007). As data was collected over 3 days each weekend for 6 month periods in 2015 and again in 2016, a total of 156 days of data collection were completed.

Participants in this study were individuals assisted by the NightWatch team during high alcohol use hours through both mobile and foot patrols within the Fortitude Valley NED. A total of 2628 interventions were completed during the two six month periods between July and December in 2015 and 2016. These 2628 interventions involved a total of 3,296 participants. Of incidents where more than one person was classified as helped, the vast majority (over 95%) were seen for the three Incidents of: 1. Diversion; 2. Assist, Care and Support; and 3. Problem Solving. Of these 3296 participants, a total of 1677 participants were involved in interventions between July and December 2015 while a further 1619 individuals were involved in interventions completed between July and December 2016. Attempts to collect non-identifiable demographic information such as age and gender from participants were made during each intervention. A total of 3138 gender records were obtained with 1839 males and 1299 females respectively. In addition to this, a total of 3035 ages were also recorded. As seen in Table 1, participants across the two years were distributed across all age groups. The majority of participants were between the

ages of 18 and 25. This is consistent with findings by Devilly et al. (2017) that the average age of an individual entering a Brisbane entertainment precinct is 22 years. Similar samples were obtained across the two time periods with an analysis of the numbers in each group showing no significant difference in association across the years ( $X^2(6, 3035) = 8.46, p = .21$ ).

#### Procedure and materials

Prior to intervention and data collection, the NightWatch team travel through the NED by foot and car. Upon interaction with an individual in need, NightWatch assess the situation and provide the necessary intervention. Once the intervention occurs, a NightWatch team member will record details of the intervention, demographics and appropriate personal information of the individual or individuals in their note book. Personal information recorded may include age, residency status and language status, however, does not include anything of an identifiable nature. This data is then reported to a communications team member who logs the intervention into a database and provides a reference number.

Data between July and December of 2015 and 2016 were then extracted from the database for coding, cleaning and analysis. To assist in this analysis process, meaningful differences in intervention were discussed with the NightWatch in order to identify a point at which NightWatch's current work load would become overwhelmed (i.e., how many more people would need to be provided with Rest and Recovery for intoxication before they needed bigger premises / more beds; how many more interventions would be required before they needed more staff).

#### Design

This research obtained approval by Griffith University Human Research Ethics Committee (Rims 2017/600). The data used in this study was archival data and ranged from July to December of 2015 and 2016. The variables included intervention type, intervention time and time of year.

#### Intervention type

Intervention type is the type of intervention provided by the NightWatch team to members of the public. This variable includes seven levels of intervention: Rest and Recovery (provision of a short-term bed, sick care, provision of water and supervision by a nurse for sobering); General First Aid (provision of physical first aid due to accidental and non-accidental injuries and medical issues); Intoxication First Aid (provision of physical help, in situ, to intoxicated people); Problem Solving (e.g., finding lost phones, finding lost friends, giving directions, providing an exit strategy to the NED, etc.); Transport (e.g., transport to hospital, providing transport options within the precinct, etc.); Assist, Care and Support (provide Assistance to emergency service workers such as ambulance officers and police and Supportive short-term Care to distressed patrons); and Diversion (diversion from and conflict resolution towards problematic behaviour such as fights, verbal assaults, criminal acts, domestic arguments, etc.).

#### Intervention time

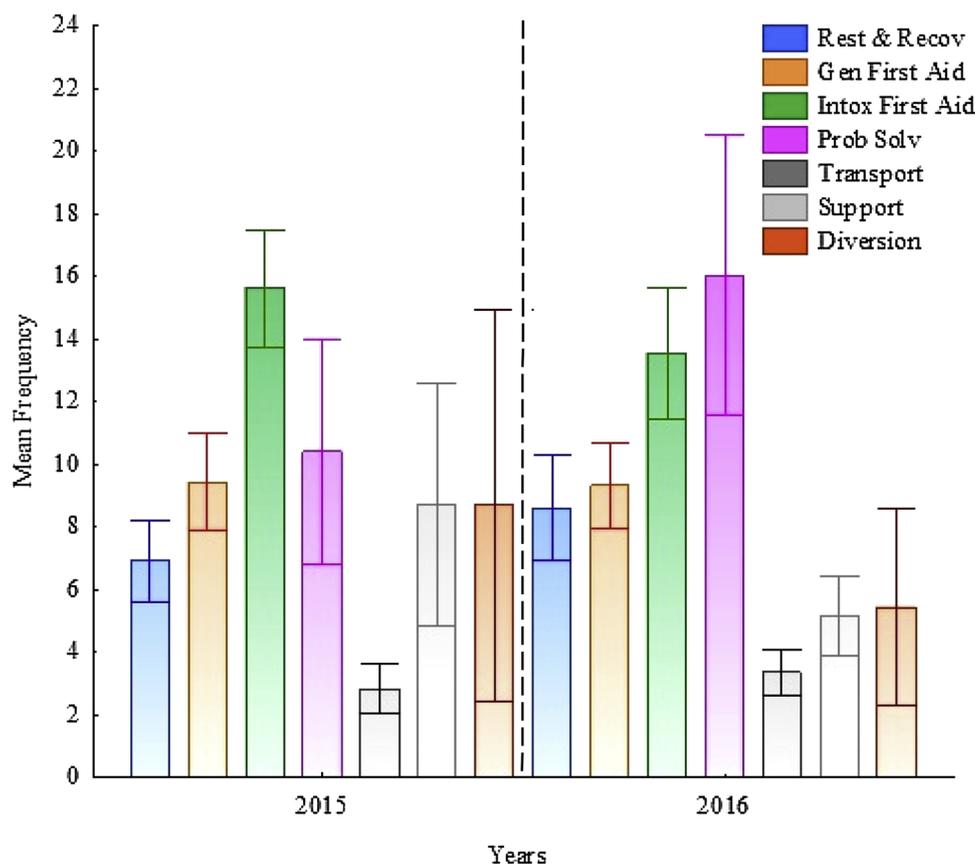
Intervention time is the time the NightWatch team member began the intervention. This variable is scaled into three levels: early evening (9 p.m. to 11.59 p.m.); mid evening (12 a.m. to 3.59 a.m.); and late evening (4 a.m. to 6 a.m.).

#### Time of year

Time of year indicates the six month period during which the data

**Table 1**  
Recorded age of participants (Numbers).

Year	17 and under	18–21	22–25	26–29	30–34	35–39	40+	Total	Genders
2015	11	579	559	167	72	40	42	1,470	M = 916 F = 636
2016	20	639	552	170	102	35	47	1,565	M = 924 F = 664
All	31	1,218	1,111	337	174	75	89	3,035	M = 1,840 F = 1,300



**Fig. 1.** The mean number of people involved in each type of intervention per week between July and December of 2015 and 2016. Error bars represent 95% Confidence Intervals.

was collected. This variable will include two levels: July through to December 2015 to test before the legislation change; and July through to December 2016 to test after the legislation change. These two periods have been selected to control for any possible seasonal effects or public holidays that may confound results.

#### Approach to analysis

Data was extracted from the NightWatch database on the 17th May 2017, prior to coding in SPSS Statistics, version 24 (IBM Corp., 2016). NightWatch data is collected to provide a broad overview of general operations, however, this was not suitable for analysis in this study. The data was reviewed and recoded to categorise variables into interventions, time period, time of night, gender and age bracket for a more targeted analysis relevant to this study. Once recoded, this data was cleaned for data entry errors, missing data and extreme outliers. Ten interventions were removed from the data set due to database entry errors that could not be rectified. Both parametric and non-parametric analyses were then completed using Statistica, version 13 (Dell Inc., 2015). A total of 26 weeks could be matched during the time periods between July and December of 2015 and 2016. Weeks were removed

from the dataset as they could not be matched due to the Christmas public holidays as well as 2015 having 53 weeks in the year while 2016 only had 52 weeks in the year.

Nine chi-square tests of independence were completed to analyse the differences between the time periods of July through to December both before and after the legislation. As the total number of days for data collection exceeded the necessary 108, it was possible that the 'problem of power' would be present within the data, finding trivial significances. The problem of power occurs when large sample sizes influence the likelihood of incorrectly rejecting the null hypothesis (Seaman & Serlin, 1998). To address this, further analyses in the form of equivalence testing were completed. Equivalence testing analyses the similarity of two groups rather than the difference between two groups, assessing whether any differences are in fact meaningful or trivial artefacts of statistical analysis (Abeysekera, 2016; Walker & Nowacki, 2011). The Two One-Sided *t*-test approach to equivalence testing is based on two null hypotheses. If one or two of the hypotheses are supported, the two samples are identified to have non-trivial differences and are, therefore, different (Schuurman, 1987). However if both hypotheses are rejected, it is suggested that the two samples are equivalent (Seaman & Serlin, 1998).

As there is no literature in regards to the meaningfulness of intervention in these circumstances, meaningful differences were drawn upon by the NightWatch team through the decision of what percentage increase on 2015 interventions would require further resources (i.e., patrol members and beds) in 2016. This percentage was then taken from the mean of each 2015 intervention and used to calculate the mean difference of both time periods based on Schuurman's (1987) Two One-Sided *t*-test. Seven equivalence tests were conducted on the seven levels of intervention to identify if the last six months of 2015 were the same as the last six months of 2016.

## Results

### Number of people

The mean frequency of individuals encountered per week was calculated for comparison for each type of intervention over the two time periods. These means were plotted and are displayed in Fig. 1. It can be seen that while some interventions, such as General First Aid and Transport, remained steady over the two times periods, other intervention types appeared to increase or decrease over the two time periods.

A chi square analysis was then run to identify the difference between the total amount of people involved in interventions and time of night over the two 6 month periods. A significant difference was observed between the two 6 month periods,  $X^2(2, 3296) = 171.494$ ,  $p < .001$ ,  $\phi = .23$ . As can be seen in Fig. 2, interventions are now occurring earlier in the evening since the implementation of the new legislation.

As an overall significant difference was found, a chi square was run for each type of intervention and time of evening. The difference in time periods that people were provided the interventions of Rest and Recovery ( $X^2(2, 422) = 27.38$ ,  $p < .001$ ,  $\phi = .25$ ), General First Aid ( $X^2(2, 506) = 24.63$ ,  $p < .001$ ,  $\phi = .22$ ), and Intoxication First Aid ( $X^2(2, 796) = 23.43$ ,  $p < .001$ ,  $\phi = .17$ ) were all found to be significant. Further, Problem Solving ( $X^2(2, 693) = 45.70$ ,  $p < .001$ ,  $\phi = .26$ ), Assist, Care and Support ( $X^2(2, 364) = 19.97$ ,  $p < .001$ ,

$\phi = .23$ ) and Diversion ( $X^2(2, 351) = 44.49$ ,  $p < .001$ ,  $\phi = .36$ ) were also found to be significantly different throughout the evening over the two time periods. The final intervention of Transport ( $X^2(2, 164) = 5.36$ ,  $p = .07$ ,  $\phi = .18$ ) was found not to be significant, thus indicating minimal change in intervention distribution throughout the evening over the two time periods.

### Number of interventions

As multiple participants can be involved in a single intervention, this study also assessed the change in number of interventions over the two time periods. The weekly mean of each intervention was calculated for comparison. These means were plotted and can be seen in Fig. 3. Similar trends can be observed in this figure as were seen in Fig. 1 involving the total number of individuals encountered. Looking at total number of interventions across the two 6 month time periods we found that there were a total of 1246 interventions provided in the 6 month period of 2015 and 1386 provided for the 6 month period in 2016. There was also a significant difference in the stratification of interventions ( $X^2(6, 2632) = 50.31$ ,  $p < .001$ ). In particular, we note that the total number of Intoxication First Aid and Problem Solving interventions over the two time periods differ more by number of interventions than they do by total of individuals encountered, as displayed in Fig. 1. There appears to be fewer Intoxication First Aid interventions and more Problem Solving interventions provided after the legislation.

Seven equivalence tests were then run on each level of intervention using the matched time periods of 2015 and 2016. These equivalence tests were based on the total number of interventions rather than the total number of participants as NightWatch attend to the intervention independent of how many individuals are involved. These seven equivalence tests were from matched weeks and, therefore, we conducted matched samples Two One-Sided *t*-Tests of equivalence.

By approaching the equivalence tests this way it is hoped that the inflation of error would be minimised. As equivalence testing seeks to assess the similarity between the two groups to identify the meaningfulness of this similarity (Abeysekera, 2016; Seaman & Serlin, 1998), the authors verified the total percentage increase in interventions from

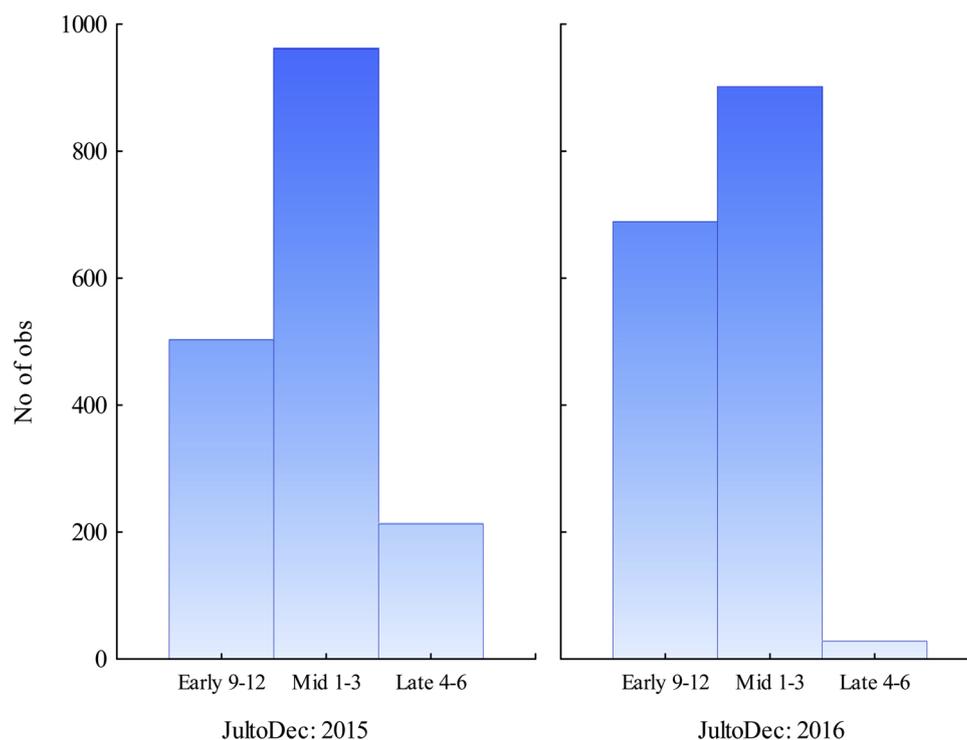


Fig. 2. The total number people involved in interventions over the course of the evening before and after the legislation change.

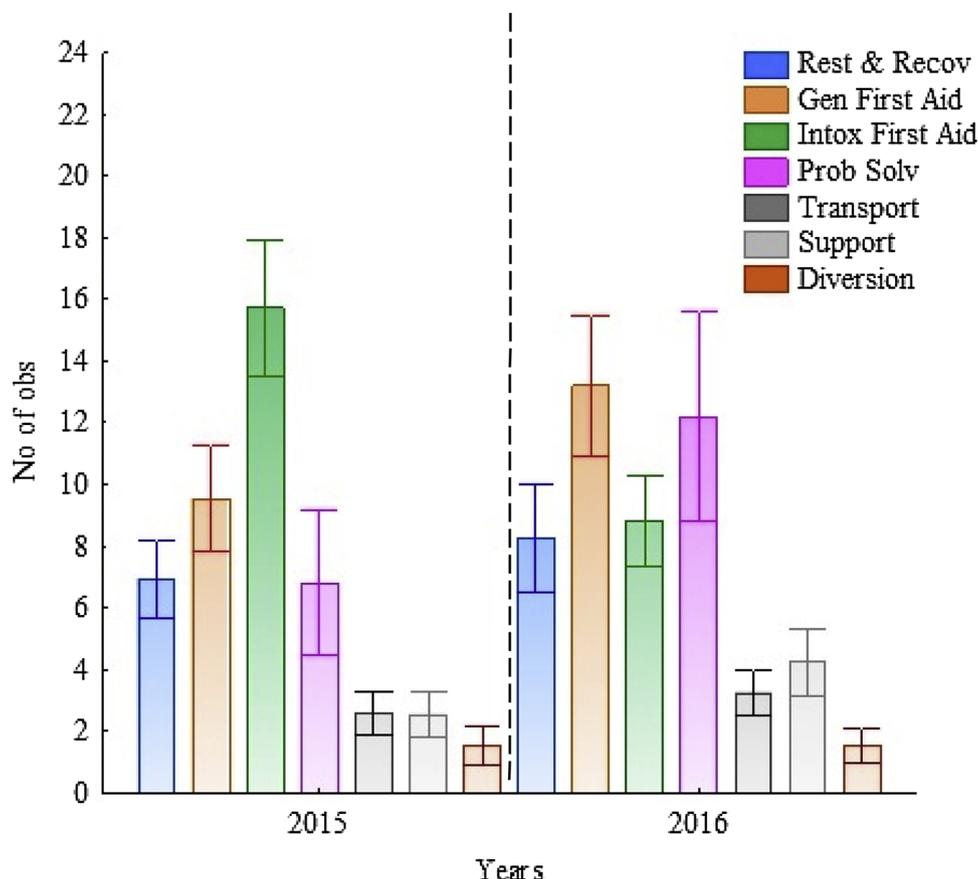


Fig. 3. The mean number of each type of intervention per week between July and December of 2015 and 2016. Error bars represent 95% Confidence Intervals.

2015 to 2016 which would require NightWatch to obtain additional resources. NightWatch stated that further resources would be required if a 12.5% increase in Rest and Recovery from 2015 to 2016 occurred. Further, a 25% increase in General First Aid and Intoxication First Aid, as well as a 10% increase in Problem Solving, Transport, Assist, Care and Support and Diversion would also require NightWatch to increase their resources. This equivalence testing approach is offered as an alternative to traditional significance testing of the number of interventions per week as it is far more conservative and relies on the meaningfulness of the results rather than just the power associated with a sample size.

General First Aid was the only intervention to reject both null hypotheses thus indicating a trivial difference between the two time periods ( $df = 25$ ,  $t_{upper} -2.120 < -1.708$ ,  $t_{lower} 2.928 > 1.708$ ). Although having enough experimental power to provide a significant difference, the total number of General First Aid interventions during the last six months of 2015 were equivalent to the total number of interventions in the matched six months of 2016. The equivalence tests for the six remaining interventions concluded that either one or two of the null hypotheses were supported thus indicating that the number of interventions over the two time periods were in fact different. For Rest and Recovery, ( $df = 25$ ,  $t_{upper} -1.708 > -2.631$ ,  $t_{lower} 1.708 > -0.878$ ) and Intoxication First Aid, ( $df = 25$ ,  $t_{upper} -1.319 < -1.708$ ,  $t_{lower} 4.647 > 1.708$ ) the lower null hypothesis was rejected while the upper null hypothesis was supported. For Problem Solving, ( $df = 25$ ,  $t_{upper} -3.840 < -1.708$ ,  $t_{lower} -3.223 < 1.708$ ), Transport, ( $df = 25$ ,  $t_{upper} -1.767 < -1.708$ ,  $t_{lower} -0.681 < 1.708$ ), and Assist, Care and Support, ( $df = 25$ ,  $t_{upper} -2.562 < -1.708$ ,  $t_{lower} -1.846 < 1.708$ ) the lower hypothesis was supported while the upper null hypothesis was rejected. Finally, both the upper and the lower null hypotheses of Diversion, ( $df = 25$ ,  $t_{upper} -0.054 > -1.708$ ,  $t_{lower} 0.936 < 1.708$ ) were supported.

#### Subsidiary analysis

It was possible to look at the change in aid provided to the different genders across time. Of course, this is self-referent as it is a percentage increase or decrease for a specific intervention (for males or females) in comparison to the total number of interventions made overall for that particular gender. However, an increase or decrease in an intervention type for both genders would have already been taken into account in the analyses above. Therefore, we were particularly interested in whether there was a significant increase or decrease for a gender on one intervention type and a significant change for the other gender on that particular intervention, but in the opposite direction. The data are presented in Table 2.

As can be seen, there were no suggestions of an interaction for gender on the type of interventions provided before and after the legislation.

#### Discussion

In the current research we aimed to assess the impact of more restrictive alcohol legislation on service delivery required by an acute intervention response team in the night time entertainment district of Brisbane. The same seven interventions were measured over the two time periods that were matched to offset seasonal variations along with public holidays and annual social events. Consistent with the results of diametrically opposed legislation in the UK (DCMS, 2008), and consistent with a large preloading culture, it was hypothesised that interventions would occur earlier in the evening. This hypothesis was supported. Further, it was hypothesised that the number of interventions would remain similar over the two time periods. This was also supported in total number of interventions delivered, but displayed a change to the profile of intervention types delivered.

**Table 2**  
Intervention by gender from before to after the legislation.

Gender	Incident	% (n) Before Legislation	% (n) After Legislation	Increase (↑) or Decrease (↓) %	Two-Sided Chi-Square, probability (Phi)
Male	Rest & Recovery	8.41 (77)	11.15 (103)	2.74%↑	3.92, p = .05 (.046)
	Gen First Aid	16.49 (151)	16.45 (152)	0.04%↓	0.0004, p = .98 (.00)
	Intox First Aid	19.65 (180)	19.59 (181)	0.06%↓	0.001, p = .97 (.00)
	Prob Solv	15.50 (142)	26.08 (241)	10.58%↑	31.24, p = .00 (.13)
	Transport	4.15 (38)	4.55 (42)	0.4%↑	0.17, p = .68, (.01)
	Assist, Care, Support	17.25 (158)	10.50 (97)	6.75%↓	17.56, p = .00 (.1)
	Diversion	18.56 (170)	11.69 (108)	6.87%↓	16.93, p = .00 (.1)
Female	Rest & Recovery	16.04 (102)	17.92 (119)	1.88%↑	0.82, p = .37 (.03)
	Gen First Aid	11.64 (74)	13.25 (88)	1.61%↑	0.78, p = .38 (.03)
	Intox First Aid	32.39 (206)	26.96 (179)	5.43%↓	4.60, p = .03 (.06)
	Prob Solv	19.66 (125)	25.75 (171)	6.09%↑	6.87, p = .009 (.07)
	Transport	3.93 (25)	5.57 (37)	1.64%↑	1.93, p = .17 (.04)
	Assist, Care, Support	9.28 (59)	6.02 (40)	3.26%↓	4.89, p = .03 (.06)
	Diversion	7.08 (45)	4.52 (30)	2.56%↓	3.91, p = .05 (.06)

Hypothesis one predicted that interventions would occur earlier in the evening during the last six months of 2016 in comparison to the last six months of 2015. This was predicted because the implementation of the [Tackling Alcohol-Fueled Violence Legislation Amendment Act, 2016](#) saw the introduction of last drinks being served at 3a.m. rather than 5a.m. while rapid intoxication alcohol is no longer served after 12a.m. This meant that if individuals were to consume alcohol they needed to do so earlier in the evening by preloading or purchasing alcohol within venues prior to sales cessation. [Fig. 2](#) demonstrated that an increase in the number of interventions occurred between the hours of 9p.m. and 11.59 p.m. in 2016 in comparison to 2015. As per the legislation, this falls in line with the limitation of rapid intoxication drinks after this time period. Although having dropped slightly, the total number of interventions between 12 a.m. and 3.59 a.m. still remained relatively high during the 2016 period. The largest difference in the number of people involved in interventions was observed after 4a.m. As alcohol provision has concluded by this time, the number of people involved in interventions had decreased dramatically in 2016.

According to previous literature, it is possible that pre-loading also contributes to this time shift. As the legislation change influenced the total amount of time that revellers can engage in alcohol consumption and leisure activities within the NED, it has previously been discussed that large numbers of individuals are entering entertainment precincts, such as the Fortitude Valley NED, already highly intoxicated. As described by [Devilly et al. \(2017\)](#), 80% of individuals surveyed had consumed alcohol prior to NED entrance, with 71% of those having a BrAC of over 0.08. As pre-loaders were up to four times more likely to drink 20 or more standard drinks over the evening than individuals who did not preload ([Hughes et al., 2007](#)), the intoxication levels of these individuals are likely to reach higher levels at an earlier time, thus requiring earlier intervention.

Hypothesis Two stated that any differences identified between the total number of interventions over the time periods before and after the legislation implementation would be trivial. As described by [Abeysekera \(2016\)](#) and [Seaman and Serlin \(1998\)](#), a trivial difference would indicate that despite a large amount of statistical power, the two time periods would in fact be similar. It was expected that the number of interventions would not increase beyond a meaningful level. This was not found for all intervention types. As NightWatch's non-trivial '25% increase' did not occur in the General First Aid intervention, this was the only intervention found to have a trivial difference over the two periods. The remaining six interventions possessed non-trivial differences as a result of increases or decreases in the number of interventions occurring from 2015 through to 2016 outside of NightWatch's estimations.

As this is the first study of its kind, it is difficult to make comparisons of these results to previous literature. We believe that if there is a more intoxicated group of patrons entering the NED and they are being

delivered interventions earlier (viz hypothesis 1), there were, in particular, fewer deliveries of Intoxication First Aid delivered on the streets (in situ) but more deliveries of Rest and Recovery in a room with a bed and vomit bucket and supervised by a nurse. This is consistent with verbal reports of fewer referrals to ambulance and emergency departments at hospitals and more provision of rest and recovery options with more beds being available in 2016, compared to 2015, due to growing demand. This interpretation is also consistent with fewer Support interventions, as ambulance workers were less likely to be called and, therefore, the NightWatch needed to make fewer assists to these ambulance workers. Fewer diversions are also consistent with the 10-year trajectory of reduced violence in the Fortitude Valley NED (homicide and assaults; [Queensland Police Map, 2018](#)).

The authors appreciate that while it may have been easier to complete null hypothesis significance testing to describe significant differences, the problem of power and 'meaningfulness' outweighed the familiarity of null hypothesis significance testing. Choosing to match the two time periods prevented seasonal variance and differences in public holidays and particular social events that occur annually, thus minimising error.

Hypothesis Three stated that no difference would occur in the total number of interventions between the two time periods before and after the implementation of the [Tackling Alcohol-Fueled Violence Legislation Amendment Act, 2016](#). This hypothesis was supported in that the total number of interventions provided was 1677 in 2015 and 1619, in 2016. However, the profile of interventions provided changed from 2015 to 2016. These changes largely mimicked the changes described above in hypothesis 2, looking at the number of people to whom the interventions were provided. We also believe that this has been influenced by a closing of smaller Brisbane City NEDs after the legislative change (e.g., Caxton Street NED) and a congregation of crowds in the larger NEDs (e.g., Fortitude Valley).

Similar to the decrease of Diversion, the decreases in General and Intoxication First Aid may also be a reflection of the change in legislation. While alcohol consumption has generally remained steady nationally ([Australian Bureau of Statistics, 2015](#)), some literature indicates that alcohol consumption has increased before entry into and within entertainment precincts ([Devilly et al., 2017](#); [Hughes et al., 2007](#)). A decrease in Intoxication First Aid being provided on the street, as reported here, may seem to not reflect this literature. This decrease may be related to either the limitation of alcohol availability within the NED as hoped by the legislative authors, or intoxication to a level that is not treatable on the street. The Rest and Recovery intervention provided to severely intoxicated individuals requiring medical supervision increased and we believe that this is an important change.

As the recent literature highlights that preloading increases overall BrAC scores ([Devilly et al., 2017](#)), it is likely that an increased need for medical intervention has occurred, and this need now occurs earlier in

the night. It is difficult to disentangle this possibility from the possibility that this is also due to the NightWatch referring fewer people to hospital and providing more Rest and Recovery interventions instead. It should be noted, however, that continued and increased need for this intervention earlier in the night has led to the organisation having to recently move to larger premises with more beds.

To our knowledge, no other study has quantitatively investigated the role and influence of having a structured approach to volunteers intervening in NEDs. The current research allowed us to investigate the effect of restrictive legislation on this service while at the same time allowing for an investigation of what this service provides within the community. The evidence is that, as hypothesised, service utilisation becomes more focussed and occurs at an earlier time of the night. However, another factor not looked at is the effect that this service has on the cost of providing care within the NED. Recent estimates have an average Queensland Ambulance Service incident to cost \$680.55 (QAS, 2017) and the reimbursable fees for an emergency department triage level 5 (least urgent) is \$648 (raising up to \$2,675 for a level 1 triage event; WorkCover Queensland, 2017). On the one hand, it is a worrying possibility that the excessive preloading is introducing a greater need for triage / rest and recovery, starting early in the night. On the other hand, it seems a very cost effective intervention to have the NightWatch as the first point of call instead of leaning on the resources of the emergency services.

Overall, there are various possibilities for our results around this issue. It is possible that a more inebriated population are entering the NED due to legislative change and this has created greater demand for more demanding interventions, such as triage. It is also possible that the NightWatch is now taking a more proactive role in the NED to release the load on the emergency services. Having spoken with all relevant bodies, it is our conclusion that it is likely to be a combination of these two factors.

We do recognise that the NightWatch organisation contains a revolving volunteer base to assist individuals in need. Thus, it is possible for different volunteers to record interventions differently. To address this limitation, the current study obtained data for two six month periods allowing for variances within the data to form general trends and not rely on a handful of people. Future research may seek to investigate the inter-rater reliability of NightWatch's data collection while providing guidelines for future recording of data. Considering we had directional hypotheses based upon the findings from Government investigations in the UK following polar opposite legislation (DCMS, 2008) and that these hypotheses were supported by our results, we believe the current outcome is more consistent with the effects of legislation rather than internal reliability issues of data collection. A limitation of this research is that it is an uncontrolled study from one location and, focusing on first aid, there are no psychological measures or detailed demographics that can be analysed to look at people's motivations or other mechanisms which might have driven change. That said, data collection was from the two major night time entertainment districts in Brisbane – the State capital of Queensland with a population of 2.4 million people. Further, with the quantitative focus of this research being on services delivered, rather than hypothesised mechanisms driving the need for these services, this research indicates real-world service requirement following policy change, without the theoretical prejudice of questionnaire selection and approach to analysis. Separate studies looking at personality factors, detailed demographics, crowd numbers, preloading and intoxication at entry and exit of the NED (before and after legislation) have been completed and are currently in submission.

There is also the issue of illicit drug use. The NightWatch does keep a record of those who report to have taken drugs. However, the NightWatch wear high-visibility shirts and frequently liaise with police to render aid. This means that we do not have faith that the rates of illicit drug use we have are accurate and do not wish to muddy an already complex issue. What we can say is that those who are provided

service and admit to being on illicit drugs are invariably also intoxicated by alcohol, but those to whom the NightWatch provide assistance due to intoxication from alcohol are not necessarily also intoxicated by illicit drugs. We do, however, have ongoing studies where we poll people specifically on illicit drug use, and provide ion scanning for verification, and would prefer to wait for these results before commenting further on this issue.

Upon reviewing the literature, it has been observed that there is limited to no research monitoring the types of intervention provided to intoxicated individuals in distress. The results of this study identified that interventions were occurring earlier in the evening after the implementation of the [Tackling Alcohol-Fueled Violence Legislation Amendment Act, 2016](#). This study also identified that a similar number of people were provided interventions but stratified differently across intervention type. There is need for future research to look into the medical and financial costs associated with legislative change into alcohol sales. However, we would argue that these studies need to be conducted by researchers independent of the Government which is introducing the legislation, the service being investigated, and not compromised by funding from registered health charities promoting temperance, or alcohol / soft drink industry companies with a product to sell. In this research we were provided access to the NightWatch database without any oversight from the organization and analysed the results independent of the organization, State or Federal Government, and any temperance groups or companies involved in the sale of alcohol. In effect, following legislation reducing the hours of alcohol sales in Brisbane's main NED, we believe that patrons' preloading required assistance from the NightWatch earlier, and required more substantive interventions.

#### Authors' contributions

Devilly obtained access to NightWatch data through negotiation with the NightWatch, managed a larger research programme, designed the research, obtained ethics clearance, analysed the data and wrote the manuscript. Sribnovski contributed to the larger research programme, designed the research, collected and transformed the data, obtained ethics clearance and wrote the manuscript.

#### Conflict of interest

None. In particular, we have not received any funding during this research from local or state governments, political organisations, lobby groups, temperance societies and health based registered charities, or companies involved in the promotion, supply or sale of alcohol.

#### Licence to publish

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#### Transparency declaration

The lead author affirms that this manuscript is an honest, accurate, and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned have been explained.

#### Role of funding source

None.

#### Ethics committee approval

Approved by Griffith University Human Research Ethics Committee 2017/600

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