Alcohol use disorders hospitalizations over the last two decades: a population-based cohort study

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Abstract

Background: Alcohol use disorders are risk factors for almost all health conditions due to heavy alcohol use. The epidemiology of alcohol use disorders can be used to monitor harms from heavy alcohol consumption.

Aims: To estimate changes in the risk of alcohol use disorders over the last two decades among the Western Australian adult population.

Method: This population-based cohort study used i) hospital separation records for Western Australian residents aged 18 years and older that occurred between 1990 and 2013 with a primary diagnosis of alcohol use disorder ii) annual Estimated Residential Population to estimate the annual gender and age specific incidence rate. A random sample of emergency presentations to public hospitals in Western Australia between 2002 and 2013 was used to account for confounding effects, such as changes in patient access to medical care and overall improvement in health care service in the multivariable Poisson regression model.

Results: Overall the risk of alcohol use disorder hospitalisations among the Western Australia population has increased considerably since 1998 with a decline in 2012 and 2013. The average rate remained significantly higher from 2010 to 2013 compared to previous years.

Conclusions: The trend of alcohol use disorder hospitalisations is indicative of an increase in harm due to heavy alcohol use in the population.

Introduction

Alcohol, a widely used psychoactive substance with dependence-producing properties, is a major risk factor for global mortality and morbidity [1, 2]. Alcohol has been widely consumed in Australia for more than two hundred years [3] and about 80 per cent of the population currently drink alcohol [4]. Health conditions that can be caused by alcohol include various cancers, liver disease, injuries from falls, physical assaults, road traffic crashes and mental health disorders[2]. *Mental and behavioural disorders due to use of alcohol* (defined by International Classification of Diseases (ICD) developed by World Health Organization)[5] or *alcohol-related disorders* (defined by Diagnostic and Statistical Manual of Mental Disorders developed by American Psychiatric Association)[6, 7] are a cluster of neuropsychiatric conditions [5-7], and they are direct contributors to the alcohol-related burden [8]. In 2010, the prevalence of harmful use of alcohol and alcohol dependence combined among the population 15 years and older were estimated to be 4.1% worldwide and 3.5% in Australia [2]. To establish a diagnosis of an *alcohol-related disorder* requires evidence of alcohol use[5-7]. For example, diagnostic criteria of alcohol use disorder includes '*alcohol is often taken in larger amounts or over a longer period than was intended',* whereas a diagnosis of alcohol intoxication requires '*clinically significant problematic behavioural or psychological changes after recent ingestion of alcohol'.* Alcohol use is assessed based on self-report data and/or objective analysis of specimens such as breath, blood, or urine[5-7]. Because of the connection with heavy alcohol use, the epidemiology of alcohol-related disorders can therefore be used to monitor harms from heavy alcohol consumption[8] including injuries and road traffic crashes, alcohol-induced mental disorders such as depression, multiple organ damage such as liver disease, hypertension, development of cancer, unsafe sex, adverse social behaviours (such as violence) and suicidal behaviour [6, 9]. This study aimed to estimate changes in the risk of alcohol use disorders (mental and behavioural disorders due to use of

alcohol), over the last two decades among the Western Australian adult population using a population-based approach.

Method

The overall annual risk of hospitalisation for alcohol disorder was first estimated by calculating the annual age-gender specific incidence rate. In order to investigate changes in overall risk over time, a multivariable Poisson regression model was employed to adjust for changes in gender and age distribution of the Western Australian population. To further account for confounding effects, such as changes in patient access to medical care and improvement in medical treatments, a newly developed proxy outcome approach [10-13] was used to offset possible biases using a random sample of emergency department admissions.

Three datasets were used in this study: i) Hospital Morbidity Data, ii) Emergency Department Data and iii) Estimated Residential Population. The Hospital Morbidity Data included all hospital admissions in Western Australia since 1970. This study includes all hospital separation records for Western Australian residents aged 18 years and older that occurred between 1990 and 2013 with a primary diagnosis of alcohol use disorder. The Hospital Morbidity Data is coded using ICD-9-CM between 1990/91 and 1998/99 (fiscal year) and using ICD-10-CM classification system between 1999 and 2013 in the data. The following codes were to extract alcohol use disorders hospitalisation records: ICD-9-CM codes; 291.0-291.9, 303.0-303.9, 305.0 and ICD-10-AM codes; F10.0-F10.9. Emergency Department Data covered emergency presentations to public hospitals in Western Australia from 2002. A random sample of 1.6 million presentations for Western Australian residents aged 18 years and older occurred between 2002 and 2013 were used in the analysis.

Data analysis

Gender and age-specific (grouped into :18-24yrs then10-year age groups from 25-74yrs and 75yrs+) as well as overall incidence rates of alcohol use disorder hospitalisations were estimated for each calendar year between 1990 and 2013. Gender and age-specific incidence rate ratios were calculated to investigate changes in risk between each four-year period and its previous four-year period (e.g. 1994-1997 vs. 1990-1993). As noted previously in the methods, multivariable Poisson regression model was employed to model changes in risk over time adjusting for changes in gender and age distribution of the Western Australian population and potential confounding effects.

Ethics

This study has been approval by Department of Health Western Australia Human Research Ethics Committee and by the Human Research Ethics Committee, Curtin University (approval number NDRI-04-2013)

Results

A total of 3,526,563 person-years at risk were accumulated from the Western Australian adult population between 1990 and 2013, incurring 58,924 hospitalisations for alcohol use disorders. The risks (95% confidence intervals) per 1,000 person-years of hospitalisation for alcohol use disorders were estimated to be 16.7 overall (16.6, 16.8) and 21.7 (21.5, 22.0) and 11.7 (11.5, 11.8) for males and females, respectively. Figure 1 shows age and gender specific annual incidence rates. The risk of alcohol use disorders has increased from the late 1990s among both genders and all ages with the exception of those aged over 75 years.

Incidence rate ratios of alcohol use disorders were further estimated to compare the risk between each four-year period and its previous four–year period for each gender and age group (Figure 2). In males significant increases were observed for periods and ages as follows: 2002-2013 for 18-24yrs; 2006-2013 for 25-24yrs; 1998-2006 and 2010-2013 for 35-44yrs; 1998-2001, 2010-2013 for 45-55yrs; 2002-2009 for 55-64yrs; 2010-2013 for 65-74yrs; and no significant increase observed for 75+yrs. In females, significant increases were observed for periods and ages as follows: 2002-2013 for18-24yrs; 1998-2001, 2006-2013 for 25-34yrs; 1994-2013 for 35-44yrs; 1998-2013 for 45-54yrs; 2006-2013 for 55-64yrs; 2002-2013 for 65yrs; and no significant increase observed for 75+ yrs. Significant decrease in risk of alcohol use disorders was observed for males, but not females and mainly observed in 1994-1997 (compared to 1990-1993) for 25-34yrs, 35-34yrs, 45-54yrs and 75yrs+ and in 2002-2005 for the 25-34yrs age group.

Moreover, as shown in Figure 1, the risk of alcohol use disorders decreased in both genders and in most age-groups in the last two years (2012 and 2013) within the latest four-year period: 2010-2013. It was also noted that the average risk was higher than the previous four-year period: 2006-2009. Annual changes in risk of alcohol use disorders for the whole population were further calculated for each year between 2011 and 2013 using multivariable Poisson regression model. In keeping with Figure 1, significant decreases in risk from the previous year were observed in 2012 (5.5%) and 2013 (11%).

The average risk of alcohol use disorder for whole Western Australia population has increased considerably in the last 10 years (Table 1), and the estimates remained similar after controlling for unmeasured confounding effects (Table 2). It was also observed that participants aged 35-64 years have higher risk of hospitalisation for alcohol use disorder.

Discussion

Overall, the incidence rate of hospitalisation for alcohol use disorders, decreased in 1994-1997 then increased from 1998, peaked in 2011, and declined in 2012 and 2013. However, the average rate remained significantly higher from 2010 to 2013 compared to previous years (Table 1 & 2). The incidence rate trend is in relatively good agreement with the National trend in per capita alcohol consumption among the 15yrs+ population, which showed a decrease in 1990-1996 and increased afterwards until about 2008 [14], whereas the decrease in the risk of alcohol use disorders in 2012 and 2013 appeared to reflect the gradual decline in per capita alcohol consumption since 2009 [15]. In addition, a similar trend has been reported among national hospitalisations for alcohol caused liver disease in Australia [16]. The decline in incidence in 2012 and 2013 is also in good agreement with data from the National Drug Strategy Household Survey (NDSHS) 2013, which showed the prevalence of lifetime risky drinkers (≥ 2 standard drinks per day on average) among 14+yrs Australian population reduced to 18.2% (21.6% in WA) in 2013 from 20.0% (23.0% in WA) in 2010, and the prevalence of consuming ≥ 4 drinks on most days/everyday reduced to 6.7% in 2013 from 7.9% in 2010 [4]. The increased risk of hospitalisation for alcohol use disorders among the 35-64yrs age group compared to the younger age groups appeared to be against the age-specific prevalence of lifetime risky drinkers (≥ 2 standard drinks per day on average) observed in the NDSHS, which was highest among the 18-24yrs age-group [4]. Alcohol use disorders are most likely developed among people who frequently use alcohol at the highest level, and data from the same survey showed that the prevalence of consuming ≥ 4 drinks on most days/everyday was higher among middle-age and older people compared to the youngest age groups [4]. Nevertheless, it is also possible that the age difference in risk of alcohol use disorder hospitalisation was at least partly due to the delay between onset of alcohol use disorders and treatment, which has been estimated to be about 18 years in Australia [17]. Also noteworthy is

that, this study used unlinked hospitalisation data, and thus repeated hospitalisation of the same patients are possible i.e. admission due to relapse in later life. In addition, the frequency of visits to general practitioners increases with age [18], and therefore, as has been observed for other medical conditions [18], alcohol use disorders may be more likely to be diagnosed among middle-aged and older people compared to younger populations.

The trends for risk of alcohol use disorder hospitalisation measured in this study indicated that harms caused by heavy alcohol use have been rising throughout most of the last two decades among Western Australians. Another finding with potential importance is that the risk of alcohol use disorders among women aged 35-54yrs appeared to keep rising until 2011 with small reductions in 2012 and 2013. Similar findings have been reported in a U.S. study which showed that the number of older people requiring treatment for alcohol problems has been increasing in recent years [19]. Concerns about heavy alcohol use behaviours and alcohol use disorders among middle-aged and older women in Australia have been discussed in recent studies[20, 21]. Findings from this study indicate that further research targeting middle-aged female daily alcohol users is important for the development of future prevention and treatment strategies.

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Conclusion

The risk of alcohol use disorder hospitalisations among the Western Australia population has increased considerably over the last two decades. This is indicative of an increase in harm due to heavy alcohol use in the population.

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Figure 1 Annual age-gender specific incidence rate (per 10,000 person years) of alcohol use disorder hospitalisations between 1990 and 2013

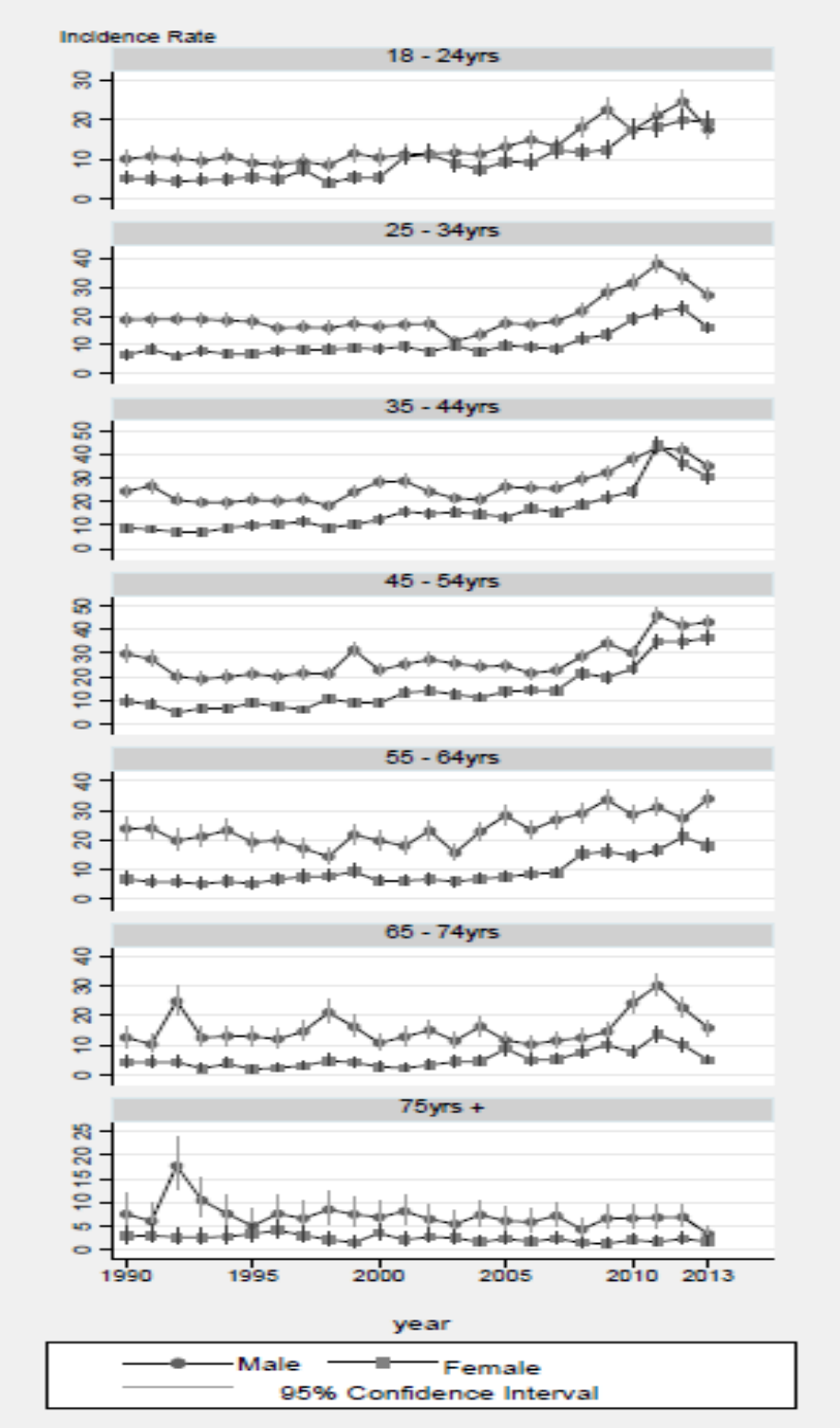

Figure 2 Changes in risk of alcohol use disorder hospitalisation between each four-year period (measured as incidence rate ratio of each denoted four-year period to its previous four–year period) by age and gender

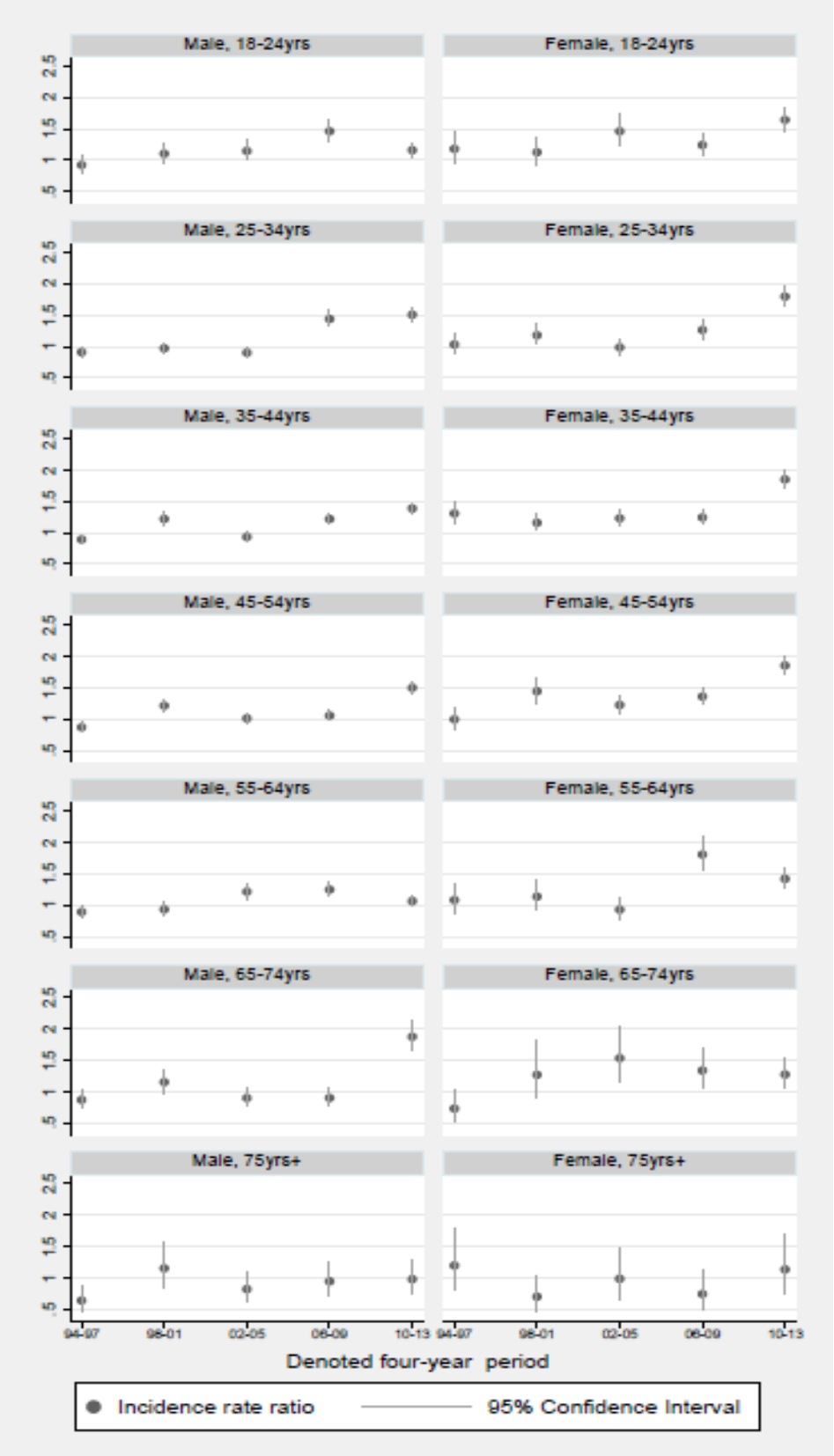

Table 1 Changes in the risk of alcohol use disorders hospitalizations over the last two decade, estimates from multivariable Poisson regression with adjustment for age and gender.

	IRR	P value	95% confidence Interval	
Observation period				
1990 -1993	0.89	< 0.001	0.86	0.92
1994 - 1997	0.84	< 0.001	0.81	0.86
1998 - 2001	0.95	< 0.001	0.92	0.98
2002 - 2005	1.00			
2006 - 2009	1.25	< 0.001	1.22	1.29
2010 - 2013	1.87	< 0.001	1.82	1.92
age group				
18 - 24	1.00			
25 - 34	1.36	< 0.001	1.32	1.41
35 - 44	1.89	< 0.001	1.83	1.95
45 - 54	1.87	< 0.001	1.81	1.92
55 - 64	1.46	< 0.001	1.41	1.51
65 - 74	0.89	< 0.001	0.85	0.93
75+	0.37	< 0.001	0.34	0.39
Gender				
Male	1.00			
Female	0.55	< 0.001	0.54	0.56

Table 2 Changes in the risk of alcohol use disorders hospitalizations for 2002 -2013, estimates from multivariable Poisson regression with adjustment for age and gender and underline trend of ED admissions.

	IRR	P value	95% Confidence Interval	
Observation period				
2002 - 2005	1.00			
2006 - 2009	1.10	< 0.001	1.07	1.13
2010 - 2013	1.52	< 0.001	1.48	1.56
age group				
18 - 24	1.00			
25 - 34	1.32	< 0.001	1.27	1.37
35 - 44	2.12	< 0.001	2.04	2.20
45 - 54	2.31	< 0.001	2.22	2.39
55 - 64	1.67	< 0.001	1.60	1.74
65 - 74	0.74	< 0.001	0.70	0.78
75+	0.14	< 0.001	0.13	0.16
sex				
Male	1.00			
Female	0.55	< 0.001	0.54	0.56