Acute alcohol co-ingestion and hospital-treated deliberate self-poisoning; is there an effect on subsequent self-harm?

Borruso LD[1], Buckley NA[1], Kirby KA[1], Carter G[2], Pilgrim JL[3], Chitty KM[1*]

1. *Translational Australian Clinical Toxicology (TACT) research group, Discipline of Pharmacology, Sydney Medical School, University of Sydney, Australia*
2. *Centre for Brain and Mental Health Research, University of Newcastle, Australia*
3. *Drug Harm Prevention Unit, Department of Forensic Medicine, Monash University, Victorian Institute of Forensic Medicine, 65 Kavanagh Street, Southbank, Victoria 3006, Australia*

Running head: Alcohol co-ingestion and repeated self-poisoning

Abstract: 280/300

Word count: 3288/3500

Conflicts of interest: Authors have no conflicts of interest to declare. An Australian National Health and Medical Research Council (NHMRC) Program Grant supported this work (NHMRC; Grant number: 1055176). An NHMRC Early Career Fellowship funds KC (Grant number: 1122362). The funding organization played no part in the design and conduct of the study; collection, management, analysis, and interpretation of the data; nor in the preparation, review, or approval of the manuscript. The authors would like to thank the many people that have contributed to the Hunter Area Toxicology Service database since 1987, including past registrars, advanced trainees, fellows, nursing staff, research assistants and computer programmers. The authors would also like to thank Ashley Stewart and Stephanie Ivezic for their aid in extracting the Hunter suicide data from the National Coronial Information System.

*Corresponding author: Kate M Chitty

Discipline of Pharmacology,

Blackburn Building (DO6), Room 301, The University of Sydney, NSW 2006.

T: +61 2 9351 8709

E: kate.chitty@sydney.edu.au

ABSTRACT

Objective: To determine the relationship between alcohol co-ingestion in an index deliberate self-poisoning (DSP) episode with repeated DSP and subsequent suicide.

Method: A retrospective cohort study was conducted involving 5669 consecutive index presentations to a toxicology service following deliberate self-poisoning between 01/01/1996 and 31/10/2010. Records were probabilistically matched to National Coronial Information System data to identify subsequent suicide. Index DSPs were categorised on co-ingestion of alcohol and primary outcomes analysed were repetition of any DSP, rates of repeated DSP, time to first repeat DSP and subsequent suicide.

Results: Co-ingestion of alcohol (ALC+VE) occurred in 35.9% of index admissions. There was no difference between ALC+VE and those that did not co-ingest alcohol (ALC-VE) in terms of proportion of repeat DSP, number of DSP events or time to first repeat DSP event. Forty-one (1.0%) were probabilistically matched to a suicide death; there was no difference in proportion of suicide between ALC+VE and ALC-VE at one or three years.

Conclusions: There was no significant relationship between the co-ingestion of alcohol in an index DSP and subsequent repeated DSP or suicide. Clinically this highlights the importance of mental health assessment of patients that present after DSP, irrespective of alcohol co-ingestion at time of event.

Keywords: alcohol, deliberate self-poisoning, suicide, repeat self-harm, hospitalisation, alcohol co-ingestion

INTRODUCTION

Suicidal behaviour encompasses a spectrum of increasingly severe behaviours that range from suicidal ideation to non-fatal self-harm or suicide attempt and ultimately to suicide mortality. Deliberate self-poisoning (DSP); the purposeful ingestion of substances never intended for human consumption or of more than a prescribed amount of medicinal substances (Bancroft, Skrimshire, Reynolds, Simkin, & Smith, 1975), is the most common form of hospital treated self-harm (Carroll, Metcalfe, & Gunnell, 2014b) and is the second most common method of suicide death in Australia (*Australian Bureau of Statistics. Causes of Death, Australia, 2013*, 2013).

Perhaps the strongest independent risk factor for future completed suicide is previous history of non-fatal suicide attempts (Beghi & Rosenbaum, 2010; Chan et al., 2016; Owens, Horrocks, & House, 2002; Suominen et al., 2004). Patients with a history of non-fatal suicide attempts are significantly more likely to carry out fatal repeat self-harm behaviour in the year following an attempt (Crandall, Fullerton-Gleason, Aguero, & LaValley, 2006; Reith, Whyte, Carter, McPherson, & Carter, 2004) with Carroll and others (Carroll et al., 2014b) estimating an overall incidence rate of 1.6% at one year and 3.9% at five years. It has also been shown that presentation to and subsequent discharge from a hospital emergency department (ED) following an episode of DSP increases the likelihood of subsequent, repeated suicide attempts (Owens, Dennis, Jones, Dove, & Dave, 1991; Owens et al., 2002). A recent systematic review of the literature estimated the incidence of non-fatal repeated self-harm behaviour (following an index episode), to be 16.3% after one year, increasing to 22.4% at five years (Carroll et al., 2014b).

Alcohol plays a complex role in the aetiology of suicidal behaviour, with both chronic alcohol use disorders and acute alcohol consumption during or before the event considered risk factors for suicide attempts and mortality (Conner, Bagge, Goldston, & Ilgen, 2014). In particular, the role of chronic alcohol abuse in promoting repeated suicidal behaviour has been studied, with Ojehagen and colleagues (Ojehagen, Danielsson, & Traskman-Bendz, 1992) reporting alcohol abuse as the most common psychiatric co-morbidity in their population of patients who demonstrated repeated DSP behaviour (occurring in 41% of all patients). A more recent French cohort study showed that chronic alcohol abuse/dependence and the consumption of 10 or more drinks per day were both significantly associated with increased risk of any repeated self-harm

compared to those who did not display such alcohol use patterns (ORs: 2.4 and 8.7, respectively) (Riedi et al., 2012). However, a recent meta-analysis of 12 prospective studies of risk factors for suicide mortality following self-harm did not identify alcohol misuse as a clear factor, with moderate heterogeneity across studies leaving insufficient evidence to identify or discount an association with subsequent suicide (Chan et al., 2016).

In contrast to research into alcohol misuse, there is a paucity of research on the effect that acute alcohol consumption (co-ingestion of alcohol) during or before an episode of self-harm might have on repeated self-harm or subsequent suicide; however, indirect evidence may suggest an association. In a systematic review of studies reporting the perspectives of health-care professionals, Saunders and collegues(Saunders, Hawton, Fortune, & Farrell, 2012) found the predominant perception of medical staff towards individuals who had deliberately self-harmed to be one of negativity and hostility. Amongst those interviewed, the only group viewed less favourably were those who presented to hospital acutely intoxicated or suffering from a substance use disorder. Furthermore, intoxicated individuals who present to the ED following self-harm are also more likely to abscond from ED before receiving potentially life-saving psychiatric help (Bennewith, Peters, Hawton, House, & Gunnell, 2005). Together, these findings suggest that the opportunity (afforded by an ED presentation) for the successful identification and treatment of some high suicide risk individuals, particularly those who are intoxicated, may be underutilized. Ultimately, missing adequate treatment for whatever reason could promote repeated episodes of suicidal behaviour from some individuals, increasing the likelihood of their completed suicide in the future.

Conversely, acute alcohol consumption in an index DSP may be associated with a decreased likelihood of repeated DSP behaviour. Alcohol co-ingestion may have a disinhibiting effect, with increased levels of impulsivity and/or self-aggressive tendencies (Bagge & Sher, 2008). There is empirical evidence to suggest that a proportion of those who consume alcohol prior to their DSP episode have lower ‘suicidal intent’ than those who do not, particularly those in which alcohol was consumed for non-facilitative (i.e., for recreation) purposes as opposed to facilitative reasons (i.e. to numb fears, enhance toxicity of poisons etc.) (Bagge, Conner, Reed, Dawkins, & Murray, 2015).

The present study aims to address this gap in knowledge and determine the unadjusted risk of alcohol co-ingestion on the repetition (or lack thereof) of DSP behaviour and subsequent suicide death. We hypothesised that there would be differences between the alcohol co-ingestion and no alcohol co-ingestion groups in terms of:

a) The proportion of each group with any repeat episode,
b) The numbers of repeat episodes,
c) The time-to-first-repeat DSP episode, and
d) The proportion of each group with suicide death.

MATERIALS AND METHODS

Study design and the data sources

The present study uses data from a prospective cohort study (Buckley, Whyte, Dawson, & Isbister, 2015) that spans 26-years from 1987 to present. Since its inception in 1987, The Hunter Area Toxicology Service (HATS) has been the only toxicology treatment service in the Greater Newcastle region of NSW. HATS services a population of roughly 500,000 and has direct clinical responsibility for all instances of adult poisoning within Newcastle and providing a tertiary referral service to poisonings that occur in Maitland and the Hunter Valley.

HATS use a structured data collection form on a fully relational Microsoft Access database (Microsoft, Washington, US) that allows for the collation of de-identified information specific to each of the over 19,000 individual poisoning admissions. This includes but is not limited to; patient demographics (age, sex, employment status, marital status, etc.), the type of poisoning episode (accidental, deliberate, recreational/misuse, occupational, environmental, iatrogenic or envenomation), the types and doses of any drugs consumed during the poisoning episode (where relevant), previous and/or current psychiatric or physical illnesses (and their treatment). It should be noted that in 1996 and then again in 2014 the database underwent changes to the way in which information was collected (especially in regards to psychiatric variables collected) and therefore, for the sake of consistency, only entries that occurred between 1 January 1996 and 31st Dec 2013 are used in this study. The National Coronial Information System (NCIS) was used to capture intentional deaths that occurred within one and three years of the last recorded

HATS admission for our study cohort. All unexpected, unnatural or suspicious deaths are investigated by an Australian coroner and are therefore captured by the NCIS.

Ethics

The Hunter New England Area Health Human Research Ethics Committee (HREC) granted approval for this research, making it possible to access and utilise HATS data and patient information. Both the Hunter New England Area Health HREC and the Justice HREC (Approval reference: CF/16/8940) approved the probabilistic matching of HATS patients to NCIS intentional deaths.

Inception rules for membership of the cohort

Records were extracted from HATS for membership of the cohort as per the following inception rules: (1) the index admission occurred at or after 1/1/1996 and before 31/12/2010 and (2) the patient was aged 18 years or over at time of index admission. The inception dates were selected to ensure a follow up period of at least 3 years after the index DSP was available for every record.

Suicide records for potential matching to our included HATS records were extracted from the NCIS if: (1) the death was classified as intentional by the coroner, and (2) the residence at time of death was within the NSW Hunter region (in order to minimise the likelihood of false positive matches). The NCIS does not hold information on deaths reported before 2000; therefore only index HATS admission records that occurred on or after 1st July 2000 were potential cases for matching. Subsequent suicide in the sample was identified through probabilistic data linkage based on name, date of birth and date of death to extracted records from the NCIS.

Figure 1 shows the study's design inclusion criteria flow diagram, explaining how our sample was chosen from the larger HATS database.

Definitions and Procedures

Each participant for their index admission was categorised into either the ALC+VE (alcohol was co-ingested) or ALC-VE (alcohol was not co–ingested) group, based on the emergency

department doctor assessment at time of admission. Demographics of each participant were extracted from the HATS database, including age, gender, marital status and employment status.

Outcomes

Repeat self-poisoning

Each patient was classified as a 'repeater' or a 'non repeater' based on whether or not they had a repeat DSP episode within one year or three years of their index event. As a result, patients who had their first repeat DSP episode more than three years after their index episode were classified as non-repeaters for the purposes of this study. For each patient, the total number of DSP admissions to HATS within one year and three years of their index event was recorded and categorised based on the number of DSP admissions during the timeframe. The categories were as follows: 1) One DSP admission in timeframe (i.e. no repeat DSP admissions); 2) Two DSP admissions during timeframe (i.e. one repeat DSP); 3) Three DSP admissions during timeframe; or 4) Four or more DSP admissions during the timeframe. Moreover, the latency between index and first repeat DSP event (within 3 years) was also calculated. The outcomes were as follows:

1. The proportion of each group with any repeat episode after one year and three years.
2. The number of repeat episodes in one year and three years.
3. The time-to-first-repeat DSP episode.

The one and three year cut-offs were chosen for several reasons. The one-year cut-off is the standard, most commonly used and clinically relevant measure in suicide and self-harm research (Carroll, Metcalfe, & Gunnell, 2014a). Moreover, it is also a time-period in which subsequent suicidal behaviour could reasonably be related to the characteristics of the index attempt (i.e. alcohol co-ingestion status or treatment received) (Carroll et al., 2014a). The three-year cut-off was chosen in order to further characterise the longer-term relationship between acute alcohol consumption and repeated DSP behaviour.

Suicide

Once a positive probabilistic match between HATS patients and an NCIS suicide case had occurred, the date between the index DSP admission date and date of death was calculated.

When death occurred within one year and three years of index HATS admission, the subsequent suicide was coded for the case.

Analysis

Statistical analysis was carried out using IBM's 'Statistical Package for the Social Sciences' [Version 22.0] software (SPSS). Age and gender compositions were compared between the two groups using Mann-Whitney analysis ($\alpha < 0.05$) and Chi-Square analysis ($\alpha < 0.05$) then tabulated with other demographic data including marital status and employment status.

Chi-square analysis ($\alpha < 0.05$) was used to identify any difference in the proportion of both ALC-VE and ALC+VE groups who had any repeat DSP within one and three years of their first admission and differences in proportion of subsequent suicide. Mann-Whitney U analysis ($\alpha < 0.05$) was used to identify any significant difference in distributions in terms of total number of DSPs during one and three years and if there was any significant difference in the distributions of time between the index and first repeat (i.e. 2nd) DSP episode between groups.

RESULTS

Subjects

There were 5669 admissions to a HATS affiliated hospital for an index DSP episode between 01/01/1996 and 31/10/2010. Of these, 2323 (41%) were male and 3346 (59%) were female. The median age of the cohort was 34.0 years (IQR: 19.0) at the time of the index event. We found that 35.9% (n = 2033) of index admissions involved the co-ingestion of alcohol (ALC+VE group) and 64.1% (n = 3636) did not (ALC-VE group).

Patients included in the suicide sub-analysis comprised 4040 patients who had their index admission to HATS after 1st July 2000. Of those, 41 were probabilistically matched to an NCIS suicide death within three years of their first admission to HATS within our study timeframe.

Characteristics of the ALC-VE and ALC+VE groups

Individuals in the ALC+VE group were significantly older than those in the ALC-VE group (median ages; 36.0 vs. 33.0 years old, respectively ($p < 0.001$)). ALC+VE patients were more likely to be male (45.2% vs. 38.6%; chi-square (2) = 23.4, $p < 0.001$). There were no notable differences between groups in terms of marital or employment status. Table 1 shows the demographic characteristics of the two groups.

Repetition outcomes

Proportion of each group that had a repeat episode

Overall, 11% (n = 624) of patients had a repeat DSP episode within one year of their index episode with no significant difference between the ALC+VE (11.9%, 95%CI: 10.5 – 13.3, n = 241) and ALC-VE (10.5% 95%CI: 9.6 – 11.6, n = 383) groups (chi-square (1) = 2.32, p = 0.128). A total of 964 (17.0%) patients had had a repeat DSP episode within three years of their index attempt with no significant difference between the ALC+VE (18.0%, 95%CI: 16.4 – 19.7, n = 366) and ALC-VE (16.4%, 95%CI: 15.3 – 17.7, n = 598) groups (chi-square (1) = 2.24, p = 0.135).

Distributions of the number of DSPs per group

Mann-Whitney U did not reveal any significant difference between ALC+VE and ALC-VE in terms of distribution of total number of DSPs after one year or three years. Table 2 shows the total number of DSP admissions to HATS within one year and three years of their index event categorised into 1, 2, 3 and 4 or more admissions during the timeframes.

Time to first repetition

For patients who had a repeat episode within one year of their index event, the mean and median times between index and first repeat DSP were 119 days and 91 days, respectively, with no significant difference in the distribution of times between ALC+VE (mean = 110 days, median = 79 days) and ALC-VE groups (mean = 125 days, median = 98 days). For patients who had a repeat episode within three years of their index event, the mean and median times between index

and first repeat DSP were 309 days and 212 days, respectively, with no significant difference in the distributions between ALC+VE (mean = 292 days, median = 189 days) and ALC-VE groups (mean = 222 days, median = 320 days). Figure 2 represents visually the percentage of repeaters who had had their first repeat episode by each month, within the entire three-year follow-up period.

Suicide

Of the 4040 patients eligible for the suicide sub-analysis, we identified 28 (0.7%) whom subsequently died of suicide within one year of their index HATS admission and 41 (1.0%) who subsequently died of suicide within three years. There was no significant difference between ALC+VE and ALC-VE in terms of proportions of subsequent suicide death after one year (chi-square (2) = 1.93, p = 0.17), with 7 out of 1522 ALC+VE (0.46%, 95%CI: 0.19 – 0.95) and 21 out of 2518 ALC-VE (0.83%, 95%CI: 0.52 – 1.3). Nor was there any significant differences in suicide deaths between ALC+VE (n = 13, 0.85%, 95%CI: 0.46 – 1.5) and ALC-VE (n=28, 1.1%, 95%CI:0.74 – 1.6) 3 years after index admission (chi-square (2) = 0.63, p = 0.43).

DISCUSSION

Overall, alcohol co-ingestion was common in our sample; with 35.8% (n = 2033) of the index DSPs we examined in this study classified as ALC+VE; a figure that falls within the range typically reported in the DSP literature (30%(Oh, Park, Jeong, Kim, & Lee, 2011) and 36% (Hendrix, Verelst, Desruelles, & Gillet, 2013)). There were no significant differences between the ALC-VE and ALC+VE groups in any of the analyses. As a result, all four hypotheses proposed in this study were rejected. Therefore, it would appear that alcohol co-ingestion during a patient's index DSP is not associated with any substantial differences in repeated DSP behaviour or subsequent suicide. In finding no significant difference between the two groups, we can infer that patients who co-ingest alcohol in their index DSP are as likely as those who do not co-ingest to have a repeat DSP episode or die from suicide. As well as this, we can infer that both groups of patients have similar total numbers of repeat episodes and tend to repeat within a similar time-frame; within one year and three years of their index attempt.

The relative similarity between the groups provides evidence to oppose the commonly held clinical perception that ALC+VE DSPs episodes are spontaneous, one-off occurrences, warrant less concern and are not representative of the typical DSP behaviour (Bagge et al., 2015; Redley, 2010). Moreover, it suggests that alcohol co-ingestion during an index DSP event is not a feature of the poisoning event that has an effect on future repeated DSP behaviour and perhaps the focus of research should shift more towards different features of the poisoning which might (such as its medical severity, or the nature of the toxins taken in the DSP). Finally, it suggests that in general if acute alcohol ingestion does have an impact on DSP behaviour, it is more likely to be relevant in the shorter term, as a proximal risk-modulating factor.

Clinically these results highlight that mental health assessment is equally important for ALC+VE and ALC-VE groups. While an episode of DSP involving co-ingested alcohol may not be viewed as serious as one where alcohol is not involved, and the level of absconding in this population higher, the risk of repeated DSP and suicide are equally likely. Hence, it is important to introduce measures to ensure that all DSP episodes receive the recommended management for deliberate self-harm (Carter et al., 2016).

Limitations and future directions

There are some limitations to the current study that arise from the use of the HATS database, conceived in 1987 (and modified in 1996), that was not originally designed for the purposes of this study. The retrospective use of prospectively collected data by this study is reliant on HATS accurately recording alcohol co-ingestion status for each DSP episode. This assessment is likely to be accurate as it is determined by experienced clinical staff and is derived from clinical signs of intoxication and in some cases a blood alcohol level is taken. Any misclassification between ALC-VE and ALC+VE is likely to be minor.

However, simple classification into ALC-VE/ALC+VE does not provide important qualitative information with regards to involvement of alcohol. This limits the possible inferences in terms of the motivation behind the drinking (i.e, if consumed <u>before</u> the DSP, does alcohol co-ingestion act as a disinhibiting agent, leading to DSP? Or is it instead used for a boost of 'liquid courage'? Similarly, if co-ingested <u>during</u> the DSP, is it to enhance the toxicity of other agents used in the DSP or simply to help 'wash the tablets down'?). Qualitative information regarding

the role of alcohol in the DSP is pertinent to understanding what determines the risk of future DSP and how alcohol may be involved. As such, further research should look to explore, potentially using qualitative methods, the timing and motivation behind alcohol co-ingestion in patients who DSP in order to identify any other factors that could be contributing to their repeating behaviour (or not). The amount of alcohol consumed in each episode was not taken into consideration because the dose of alcohol consumed has only been estimated in less than half of the ALC+VE cases in HATS.

In order to limit false positives, we restricted the NCIS source population to those with a residential postcode at time of death in the same region for which HATS services – that is, the NSW Hunter. Therefore, patients who moved outside this region within three years following their final admission to HATS would not have been captured in our NCIS source population if they had subsequently died.

Repeated self-harm is a relatively rare event in this sample (~11% and 17% at 1 year and 3 years, respectively). Hence, there might be small true differences between the groups that we could not demonstrate but that a larger study may be able to find. Likewise, suicide is an even rarer event (~1.0%), hence the statistical estimates of completed suicide need to be considered with caution.

It is possible that patients included in this cohort had a repeat hospital admission for self-harm using other methods (i.e. not DSP) and therefore not collected in this study. Hence, this study is not generalizable to all methods of deliberate self-harm.

Conclusions

In conclusion, the current study demonstrated that there is no significant relationship between acute alcohol consumption during an index DSP and subsequent repeated suicidal behaviour. The lack of difference between the ALC-VE and ALC+VE groups indicates that the involvement of alcohol *per se* in an index DSP is not a particularly relevant feature of the poisoning episode when it comes to determining what potentiates or minimises the risk of future, repeated DSP episodes. Moreover, we can now say that DSPs involving alcohol are reflective of typical (non-alcohol) DSP behaviour when it comes to the pattern of future repeated episodes and

subsequent suicide; thus helping to dispel the notion that DSPs involving alcohol are one-off occurrences that can be taken less seriously.

REFERENCES:

Australian Bureau of Statistics. Causes of Death, Australia, 2013. (2013). Canberra Retrieved from http://www.abs.gov.au/ausstats/abs@.nsf/Lookup/by%20Subject/3303.0~2013~Main%20Features~Method%20of%20Suicide~10011.

Bagge, C. L., Conner, K. R., Reed, L., Dawkins, M., & Murray, K. (2015). Alcohol use to facilitate a suicide attempt: an event-based examination. *J Stud Alcohol Drugs, 76*(3), 474-481.

Bagge, C. L., & Sher, K. J. (2008). Adolescent alcohol involvement and suicide attempts: toward the development of a conceptual framework. *Clin Psychol Rev, 28*(8), 1283-1296. doi:10.1016/j.cpr.2008.06.002

Bancroft, J. H., Skrimshire, A. M., Reynolds, F., Simkin, S., & Smith, J. (1975). Self-poisoning and self-injury in the Oxford area. Epidemiological aspects 1969-73. *Br J Prev Soc Med, 29*(3), 170-177.

Beghi, M., & Rosenbaum, J. F. (2010). Risk factors for fatal and nonfatal repetition of suicide attempt: a critical appraisal. *Curr Opin Psychiatry, 23*(4), 349-355. doi:10.1097/YCO.0b013e32833ad783

Bennewith, O., Peters, T. J., Hawton, K., House, A., & Gunnell, D. (2005). Factors associated with the non-assessment of self-harm patients attending an Accident and Emergency Department: results of a national study. *J Affect Disord, 89*(1-3), 91-97. doi:10.1016/j.jad.2005.08.011

Buckley, N. A., Whyte, I. M., Dawson, A. H., & Isbister, G. K. (2015). A prospective cohort study of trends in self-poisoning, Newcastle, Australia, 1987-2012: plus ca change, plus c'est la meme chose. *Med J Aust, 202*(8), 438-442.

Carroll, R., Metcalfe, C., & Gunnell, D. (2014a). Hospital management of self-harm patients and risk of repetition: systematic review and meta-analysis. *J Affect Disord, 168*, 476-483. doi:10.1016/j.jad.2014.06.027

Carroll, R., Metcalfe, C., & Gunnell, D. (2014b). Hospital presenting self-harm and risk of fatal and non-fatal repetition: systematic review and meta-analysis. *PLoS One, 9*(2), e89944. doi:10.1371/journal.pone.0089944

Carter, G., Page, A., Large, M., Hetrick, S., Milner, A. J., Bendit, N., . . . Christensen, H. (2016). Royal Australian and New Zealand College of Psychiatrists clinical practice guideline for the management of deliberate self-harm. *Aust N Z J Psychiatry, 50*(10), 939-1000. doi:10.1177/0004867416661039

Chan, M. K., Bhatti, H., Meader, N., Stockton, S., Evans, J., O'Connor, R. C., . . . Kendall, T. (2016). Predicting suicide following self-harm: systematic review of risk factors and risk scales. *Br J Psychiatry, 209*(4), 277-283. doi:10.1192/bjp.bp.115.170050

Conner, K. R., Bagge, C. L., Goldston, D. B., & Ilgen, M. A. (2014). Alcohol and suicidal behavior: what is known and what can be done. *Am J Prev Med, 47*(3 Suppl 2), S204-208. doi:10.1016/j.amepre.2014.06.007

Crandall, C., Fullerton-Gleason, L., Aguero, R., & LaValley, J. (2006). Subsequent suicide mortality among emergency department patients seen for suicidal behavior. *Acad Emerg Med, 13*(4), 435-442. doi:10.1197/j.aem.2005.11.072

Hendrix, L., Verelst, S., Desruelles, D., & Gillet, J. B. (2013). Deliberate self-poisoning: characteristics of patients and impact on the emergency department of a large university hospital. *Emerg Med J, 30*(1), e9. doi:10.1136/emermed-2011-201033

Oh, S. H., Park, K. N., Jeong, S. H., Kim, H. J., & Lee, C. C. (2011). Deliberate self-poisoning: factors associated with recurrent self-poisoning. *Am J Emerg Med, 29*(8), 908-912. doi:10.1016/j.ajem.2011.03.015

Ojehagen, A., Danielsson, M., & Traskman-Bendz, L. (1992). Deliberate self-poisoning: treatment follow-up of repeaters and nonrepeaters. *Acta Psychiatr Scand, 85*(5), 370-375.

Owens, D., Dennis, M., Jones, S., Dove, A., & Dave, S. (1991). Self-poisoning patients discharged from accident and emergency: risk factors and outcome. *J R Coll Physicians Lond, 25*(3), 218-222.

Owens, D., Horrocks, J., & House, A. (2002). Fatal and non-fatal repetition of self-harm. Systematic review. *Br J Psychiatry, 181*, 193-199.

Redley, M. (2010). The clinical assessment of patients admitted to hospital following an episode of self-harm: a qualitative study. *Sociol Health Illn, 32*(3), 470-485. doi:10.1111/j.1467-9566.2009.01210.x

Reith, D. M., Whyte, I., Carter, G., McPherson, M., & Carter, N. (2004). Risk factors for suicide and other deaths following hospital treated self-poisoning in Australia. *Aust N Z J Psychiatry, 38*(7), 520-525. doi:10.1080/j.1440-1614.2004.01405.x

Riedi, G., Mathur, A., Seguin, M., Bousquet, B., Czapla, P., Charpentier, S., . . . Birmes, P. (2012). Alcohol and repeated deliberate self-harm: preliminary results of the French cohort study of risk for repeated incomplete suicides. *Crisis, 33*(6), 358-363. doi:10.1027/0227-5910/a000148

Saunders, K. E., Hawton, K., Fortune, S., & Farrell, S. (2012). Attitudes and knowledge of clinical staff regarding people who self-harm: a systematic review. *J Affect Disord, 139*(3), 205-216. doi:10.1016/j.jad.2011.08.024

Suominen, K., Isometsa, E., Suokas, J., Haukka, J., Achte, K., & Lonnqvist, J. (2004). Completed suicide after a suicide attempt: a 37-year follow-up study. *Am J Psychiatry, 161*(3), 562-563. doi:10.1176/appi.ajp.161.3.562

Table 1. Demographic characteristics of patients classified by alcohol co-ingestion status at the time of index DSP.

Variable		ALC-VE (n = 3636) n	%	ALC+VE (n = 2033) n	%
Gender	Male	1406	38.7	917	45.1
	Female	2230	61.3	1116	54.9
Age	18-24	982	27.0	404	19.9
	25-34	988	27.2	511	25.1
	35-44	788	21.7	587	28.9
	45-54	459	12.6	381	18.7
	55-64	185	5.1	110	5.4
	65-74	111	3.1	29	1.4
	75+	121	3.3	11	0.5
Marital Status (n = 5400) missing n = 229	Married/De Facto	1152	32.3	613	32.7
	Single	1736	48.7	911	48.5
	Divorced/Separated	554	15.6	312	16.6
	Widowed	121	3.4	41	2.9
Employment Status (n = 3794) missing n = 1875	Full-time	628	26.0	422	30.6
	Part-time	130	5.4	76	5.5
	Student	171	7.1	72	5.2
	Unemployed	627	26.0	335	24.3
	Retired/Pensioner	644	26.7	343	24.9
	Home Duties/Other	214	8.9	132	9.6

DSP: deliberate self-poisoning; ALC-VE: alcohol not co-ingested at index admission; ALC+VE: alcohol co-ingested at index admission

Table 2. Total number of total DSPs at one year and three years.

Timeframe	Number of DSPs	ALC-VE n (%)	ALC+VE n (%)
1 year	1 (index only)	3253 (89.5)	1792 (88.1)
	2	278 (7.6)	172 (8.5)
	3	60 (1.7)	38 (1.9)
	4 or more	45 (1.2)	31 (1.5)
3 years	1 (index only)	3038 (83.6)	1667 (82.0)
	2	369 (10.9)	241 (11.9)
	3	117 (3.2)	64 (3.1)
	4 or more	85 (2.3)	61 (3.0)

DSP: deliberate self-poisoning; ALC-VE: alcohol not co-ingested at index admission; ALC+VE: alcohol co-ingested at index admission

Figure 1. Inclusion criteria flow-chart. Detailed breakdown of how individual admissions were selected for inclusion. Note: For the purposes of this study, individuals who had a recorded episode of DSP prior to 1/1/1996 and subsequent, repeated episodes after 1/1/1996 were excluded.
[1] Includes repeat admissions of those whose first admission occurred outside of date range
[2] Suicide deaths that occurred within 3 years of index admission
ALC-VE: alcohol not co-ingested at index admission; ALC+VE: alcohol co-ingested at index admission; DSP: deliberate self-poisoning; HATS: Hunter Area Toxicology Service; NCIS: National Coronial Information System.

Figure 2: Cumulative percentage of patients that had had their first repeat (i.e. 2nd) DSP episode at each time point since their index DSP