The Effect of a Breath Alcohol Level Measurement on Length of Stay and Clinical Management of Acutely Intoxicated Patients in an Emergency Department

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Contents

Index of Figures iii
Signed Statement iv
Acknowledgement ..... **Error! Bookmark not defined.**
Abstract vi
Background vi
Method vi
Results vi
Conclusion vii
Chapter 1: Introduction 1
Context of study 1
Research Problem 2
Aims and objectives 3
Research question 3
Thesis Layout 3
Significance of study 3
Conclusion 4
Chapter 2: Literature Review 5
Introduction 5
Length of stay in Emergency Departments 6
Alcohol intoxication in the Emergency Department 7
Treating alcohol intoxication 8
What does all this mean? 12
Chapter 3: Method 15
Introduction 15
Description 15
Ethical Review 17
Data gathering instruments/procedures 18
Validity and reliability review 19
Statistical analysis 20
Conclusion/summary on method 21
Chapter 4: Results 22
Introduction 22

Data Analysis 22
Descriptive Analysis 23
Demographic Data 23
Breath Alcohol Level 24
Length of Stay 26
Interventions 26
Inferential Analysis 27
Conclusion 33
Chapter 5: Discussion 34
Introduction 34
Study Findings 34
Thiamine 36
Ondansetron 36
Intravenous Therapy 37
Breath Alcohol Level 37
Demographic Data 39
Age 39
Gender 40
Study Limitations 41
Implications for Clinical Practice 43
Recommendations for further research 44
Conclusion 45
References 47
Appendices 51
Appendix 1 Organisation Wide Instruction for Study Location 52
Appendix 2 Ethical Approval from Local Health Network 58
..... 59
Appendix 3 Ethical Approval from Human Research Ethic Committee from University of Adelaide 61
Appendix 4 Data Collection Form 73

Index of Figures

Figure 1: Literature Inclusion Flow Chart……..13

Figure 2: Data Inclusion Flow Chart ……..…17

Figure 3: Age with Gender Representation ……..……..…23

Figure 4: Scatterplot displaying Initial BAL and Length of Stay Relationship ……...…24

Figure 5: Breath Alcohol Levels Performed ……25

Table 1: Frequencies of Length of Stay and BAL …….....26

Table 2: Frequencies of Treatments …….....26

Table 3: Chi Square Results ……..…….27

Table 4: Independent Sample T-Test Results ……29

Table 5: One Way ANOVA Results ……32

Signed Statement

I declare this thesis contains no material which has been accepted for the award of any other degree or diploma in any university and that, to the best of my knowledge and belief this thesis contains no material previously published or written by another person except where due reference is made in text.

I consent to the thesis being made available for photocopying and loan if accepted for the award of the degree.

Kelly Mooney

8th November 2018

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Abstract

Background

Alcohol use and misuse is a common occurrence in Australian society with one in seven Emergency Department Presentations being alcohol related. Despite substantial literature on the treatment and management of acute alcohol intoxication there is no consistency in the approach to treatment and diagnosis. With a lack of literature on the use of breath alcohol level measurement as a diagnostic tool and the focus of Australian Emergency Departments being length of stay, this study compares them alongside the additional interventions provided throughout the patient journey in the Emergency Department.

Method

A retrospective study of patient case notes from the calendar year 2016 was conducted. Five hundred and ninety episodes of care met the inclusion criteria and data was collected from the patient case notes and the Emergency Department computer system. This data included identifying treatment provided, breath alcohol levels, length of stay and demographic data. The data was analysed and then interpreted.

Results

Results revealed that having a breath alcohol level measurement affected length of stay and interventions in the Emergency Department but the value of that breath alcohol level did not influence length of stay or the interventions provided. This indicates that utilising a breath alcohol measurement for determining whether a person is intoxicated affects patient journey through the Emergency Department, however utilising it to determine how intoxicated a patient is, is unlikely to change their Emergency Department journey.

Conclusion

This study provides evidence on current practice in an Australian Emergency Department. It showed there was a lack of consistency in approach to treatment of acute alcohol intoxication and suggests some implications to clinical practice for Emergency Department clinicians, and examples of where future research would be beneficial.

Chapter 1: Introduction

Alcohol use and misuse is a growing and complex problem in Australian culture and is having an increasing impact on Australian Emergency Departments. There is significant evidence in the literature relating to the treatment of acute alcohol toxicity, clinical decision making in the treatment of acute alcohol toxicity and the journey of acutely intoxicated patients through the healthcare system. There is, however, limited literature available on the use of breath alcohol level measurements for diagnostic purposes and particularly for acute alcohol intoxication. Knowing more about how a breath alcohol level influences treatment and management of acute alcohol intoxicated patients could lead to improved policy making and enhance the patient journey through the Emergency Department.

Context of study

Current Australian research identifies that Australian and New Zealand Emergency Departments experience alcohol related presentations at a rate of one in seven of all Emergency Department presentations (McLay et al. 2017). Compounded with the hospital costs to the Australian Healthcare system of $833.1million in 2004-05, the impact on Emergency Departments as the frontline to the healthcare system is confronting (Collins & Lapsley 2008; Egerton-Warburton et al. 2018). With research on alcohol intoxication touching on everything from the interventions to the management of alcohol related injuries and trauma, there are many gaps of knowledge including breath alcohol levels used as a diagnostic tool and how this impacts clinical decision making relating to treatment and patient length of stay.

Much of the literature available demonstrates a divided approach on the treatment of alcohol intoxication. There appears to be two different schools of thought when treating alcohol intoxication, the first being a conservative observational approach and the other to actively and aggressively treat (Donnelly, Kent-Wilkinson & Rush 2013; Hindmarch, Land & Wright 2012;

Homma et al. 2018; Li, J, Mills & Erato 1999; Morgan 2015; Perez et al. 2013; Snyder, Kivlehan & Collopy 2014; Vonghia et al. 2008). The increased use of breath alcohol level measurement as a diagnostic tool even though there is a lack of literature around its use in the acute setting (Gmel et al. 2008; Kaisdotter Andersson et al. 2015; Olson et al. 2013; Sebbane et al. 2012), demonstrates a gap in knowledge that warrants further exploration.

As the Emergency Department is at the forefront of the Australian healthcare system it is essential to look at the standards and expectations of the Emergency Department including the National Emergency Access Target. The Australian government introduced the National Emergency Access Target in 2011 to improve patient safety and access to Australian Emergency Departments by specifying a target of four hours to treat and discharge or admit patients to ensure safe throughput (*Emergency department care 2016–17 Australian hospital statistics* 2017; Scott et al. 2017). This four hour target now provides a basis to compare Emergency Departments and their performance due to patient's length of stay.

Research Problem

While investigating the broader issues of acute alcohol intoxication in the Emergency Department, a search for policy or procedure based documents on this group was undertaken. An organisation wide instruction was found titled Alcohol Intoxication (Appendix 1). However, this document guided clinicians to consider alcohol withdrawal and whether the patient was safe to discharge rather than a guide to the treatment of acute alcohol intoxication. There was no reference to the use of breath alcohol measurement and levels, or was there reference to clinical treatment options for acute alcohol intoxication. This would indicate that clinicians were able to devise their own treatment plans with treatment dependent on their knowledge and experiences of current evidence and best practice. This inconsistent approach also impacts the targets within the National Emergency Access Target and the length of stay of intoxicated patients as there are no guidelines on what interventions are appropriate.

Aims and objectives

This study aimed to examine the impact of breath alcohol on treatment and length of stay of acutely intoxicated patients presenting to the Emergency Department. By exploring relationships between breath alcohol levels, length of stay and the different forms of interventions this study hopes to contribute information regarding what is acceptable treatment for this group of patients aiming to meet the four hour targets for the National Emergency Access Target and ensuring a safe and consistent journey for patients.

Research question

This study was designed to address the question:

"How does a recorded Breath Alcohol Level influence the clinical management of an intoxicated patient and their length of stay in the Emergency Department?"

This study examined whether a breath alcohol level was measured, what was the breath alcohol level measurement, what were the interventions provided and the effects these variables had on patient length of stay.

Thesis Layout

This thesis will present a review of the literature about the impacts of alcohol intoxication, treatment for acute alcohol intoxication, the importance of length of stay and the prevalence and impact of alcohol intoxication on the Emergency Department. It will then discuss the method this study undertook in order to gather the data for the study, including the process of ethical review and design of the data collection form. It will then present the data and the results of the statistical analysis that was undertaken. This thesis will then discuss the results in more detail, interpreting the meaning of the results in reference to existing literature and how they relate back to the research question while also identifying limitations and areas of further study.

Significance of study

This study has addressed a gap in knowledge regarding the effect of utilising breath alcohol level measurement on acutely intoxicated patients' journey through the Emergency Department. This

study has identified that there is a lack of guidelines and policies to inform clinical practice regarding acute alcohol intoxication due to conflicting evidence in the literature. This study provides evidence and direction for future research for clinical practice in Emergency Departments.

Conclusion

The study addresses the problem of a lack of consistency in policy and procedure in the management of acutely intoxicated patients by examining the use of breath alcohol levels in the Emergency Department and their effect on interventions and length of stay.

Chapter 2: Literature Review

Introduction

Alcohol use and misuse is a serious Australian and worldwide problem affecting multiple facets of life including the healthcare and criminal justice systems, and results in a financial burden on society (Dawood 2008; Donnelly, Kent-Wilkinson & Rush 2013; Havard, Shakeshaft & Conigrave 2012; Levinson et al. 2017; Mullins, Mazer-Amirshahi & Pines 2017; Snyder, Kivlehan & Collopy 2014). Alcohol consumption is socially acceptable to the majority of the population and with the low price and easy accessibility it is no surprise misuse is prevalent (Dawood 2008; Donnelly, Kent-Wilkinson & Rush 2013)

Though legally and socially acceptable it cannot be forgotten that alcohol is still classified as a drug. From a health perspective alcohol is a psychoactive substance causing central nervous system depression (Dawood 2008; Donnelly, Kent-Wilkinson & Rush 2013; Manning, Smith & Mazerolle 2013; Snyder, Kivlehan & Collopy 2014). Alcohol is consumed orally and absorbed within the gastrointestinal tract, with many variables altering rate of absorption. The exact mechanism of alcohol on the central nervous system is not clearly understood (Snyder, Kivlehan & Collopy 2014). The symptoms of intoxication are variable and can include an abnormal gait, slurred speech, impaired conscious state, agitation, aggression, vomiting and heightened emotions (Donnelly, Kent-Wilkinson & Rush 2013; Pelissier et al. 2014; Sebbane et al. 2012; Verelst et al. 2012; Vonghia et al. 2008). Vonghia (2008) identified from The Diagnostic and Statistical Manual of Mental Disorders 4th edition that the criteria for acute alcohol intoxication is when one or more symptoms are present including slurred speech, lack of coordination, unsteady gait, nystagmus, impairment of attention or memory, stupor or coma that occurred after alcohol consumption and the symptoms are not due to another medical condition. When these symptoms are witnessed by bystanders it can lead to the general public contacting emergency services to ensure the safety of the person intoxicated (Manning, Smith & Mazerolle 2013).

Because acute alcohol intoxication affects the central nervous system, one of the more concerning impacts on the human body is respiratory depression (Vonghia et al. 2008). Respiratory depression increases sedation and when coupled with the gastrointestinal symptoms, of nausea and vomiting also a symptom of alcohol intoxication the patient is at an increased risk of aspiration leading to subsequent pneumonia (Vonghia et al. 2008). This increased risk of morbidity informs observation and monitoring of acutely intoxicated patients.

The cost of alcohol intoxication on society is a concern with the social cost in Australia for 2004-05 estimated to have been in excess of $15billion dollars (Manning, Smith & Mazerolle 2013). This cost is the most recent reliable data on alcohol related costs in Australia and accounts not only for the costs to hospital and emergency services, but also to the criminal justice system including police, courts and prisons, and worker productivity including reduced workforce participation and absenteeism (Manning, Smith & Mazerolle 2013). These costings are the most current available data from the Australian Institute of Health and Welfare at the time of this study.

Collins and Lapsley (2008) looked at the effect of alcohol in the Australian healthcare system alone and found that in 2004-05 alcohol attributed to 3494 deaths, 1,031,660 days of hospital stays and a total $833.1million in hospital costs. With such a significant effect on the healthcare system it is reasonable to examine the initial interactions of people with alcohol intoxication cared for by the health care system and particularly Emergency Departments (Homma et al. 2018; Manning, Smith & Mazerolle 2013). By examining and identifying the best clinical management of patients presenting with alcohol intoxication, policy and procedure can be developed that may assist in reducing unnecessary costs, investigations, time delays and better health outcomes for the presenting patient.

Length of stay in Emergency Departments

The Australian healthcare system has performance indicators for all public hospital Emergency Departments which mandate patients must be either discharged or admitted within four hours of

presentation (*Emergency department care 2016–17 Australian hospital statistics* 2017; Scott et al. 2017). Initially this was introduced in the Australian healthcare system as the 'National Emergency Access Target' (NEAT) in 2011 in response to overcrowding and patient safety in Emergency Departments (Scott et al. 2017). Through evaluation of an Emergency Department by patient length of stay, it can be seen if treatment occurs in a timely manner and whether the Emergency Department throughput is efficient. Length of stay is an Australian national measuring tool to assess and rank Emergency Department's performance but it can also be used to measure and evaluate an individual patient's journey. The Australian Institute of Health and Welfare (AIHW) monitors all patient Emergency Department presentations and in 2016-17, 7.8million patients presented to Australian Emergency Departments with an average of 72% of patients departing within four hours (*Emergency department care 2016–17 Australian hospital statistics* 2017). This data becomes an important comparison tool when analysing Emergency Departments and their Emergency Department presentations in assessing efficiencies in health care.

Alcohol intoxication in the Emergency Department

It has been reported that alcohol consumption is increasing within all communities globally (Benger & Carter 2008; Das et al. 2014; Donnelly, Kent-Wilkinson & Rush 2013; Egerton-Warburton et al. 2018; Havard, Shakeshaft & Conigrave 2012; Hindmarch, Land & Wright 2012; Homma et al. 2018; Levinson et al. 2017; Mullins, Mazer-Amirshahi & Pines 2017; Pelissier et al. 2014; Snyder, Kivlehan & Collopy 2014; Stewart et al. 2014). Furthermore, studies from Australia have identified an increase in presentations to Emergency Departments relating to alcohol intoxication creating increased demands on Emergency Departments (Butler et al. 2016; Egerton-Warburton et al. 2018; Hindmarch, Land & Wright 2012; Homma et al. 2018; Kelleher & Cotter 2009; McLay et al. 2017; Mullins, Mazer-Amirshahi & Pines 2017; Stewart et al. 2014). These increased presentations are not all attributed to a primary diagnosis of alcohol intoxication but also include presentations relating to complications of alcohol intoxication, alcohol related exacerbations of pre-existing medical conditions and presentations relating to the misuse of substances often accompanying alcohol intoxications (Dawood 2008; Hindmarch, Land & Wright 2012; Kelleher & Cotter 2009; Li, Y & Jensen 2012; Mullins, Mazer-Amirshahi & Pines 2017; Snyder, Kivlehan & Collopy 2014; Stewart et al. 2014). With the increase in societal alcohol consumption being reflected in increased Emergency Department presentations it leads to questions

about the additional stressors placed on the department, and if these patients are being treated appropriately and in a timely manner.

Many studies identify the impact of alcohol related presentations on the Emergency Department (Butler et al. 2016; Egerton-Warburton et al. 2018; Hindmarch, Land & Wright 2012; Homma et al. 2018; Kelleher & Cotter 2009; McLay et al. 2017; Mullins, Mazer-Amirshahi & Pines 2017; Stewart et al. 2014). Recent studies have suggested the overall number of presentations related to alcohol consumption vary from 2% to 40% of all Emergency Department presentations (Callaghan et al. 2014; Das et al. 2014; Egerton-Warburton et al. 2018; Haberkern, Exadaktylos & Marty 2010; Havard, Shakeshaft & Conigrave 2012; Levinson et al. 2017; McLay et al. 2017). McLay et al. (2017) identified the impact on Australian Emergency Departments within their study based at the Royal Perth Hospital finding 15% of all Emergency Department presentations were alcohol related including medical complications, trauma from alcohol consumption and trauma from a third party affected by alcohol. With the Emergency Department at the front line of treating alcohol related harm within the community it is not surprising the impact these presentations can have on the Emergency Department environment (Egerton-Warburton et al. 2018; Hindmarch, Land & Wright 2012; Pelissier et al. 2014). Trauma is a common alcohol related presentation to the Emergency Department, Egerton-Warburton et al. (2018) identified that 6% to 45% of all injuries presenting to the Emergency Department are directly linked to alcohol consumption. It is obvious from this that alcohol intoxication as a primary diagnosis is not the only impact on the Emergency Department or hospital system. McLay et al. (2017) noted each day there are 15 deaths and 430 hospitalisations all directly caused by alcohol consumption in Australia. This statistic alone provides an example of the daily struggle for Emergency Departments and emergency services especially over the peak periods of weekends and nights (McLay et al. 2017).

Treating alcohol intoxication

Utilising breath alcohol levels as part of an assessment tool for intoxicated patients presenting to Emergency Department provides an objective measurement of the level of intoxication (Gmel et al. 2008; Kaisdotter Andersson et al. 2015; Olson et al. 2013; Sebbane et al. 2012). Breath alcohol levels are measured by the expiratory breath of the patient and is a non-invasive method for

obtaining a breath alcohol concentration. A further blood alcohol concentration can be obtained to confirm the breath alcohol reading if warranted (Gmel et al. 2008; Kaisdotter Andersson et al. 2015). Of the studies identifying breath alcohol levels within Emergency Departments most observe the lack of current studies utilising them as a diagnostic tool (Gmel et al. 2008; Sebbane et al. 2012). The benefits of breath alcohol levels compared to blood alcohol concentrations are that they are a less invasive, painless method with immediate results (Kaisdotter Andersson et al. 2015; Sebbane et al. 2012). The disadvantages of using breath alcohol measurements are the need for patient cooperation, and that the patient has adequate respiratory function. Furthermore, breath alcohol requires an additional test to undertake, whereas a blood alcohol level is simply an additional laboratory test on blood already sampled from the patient (Gmel et al. 2008; Kaisdotter Andersson et al. 2015; Olson et al. 2013; Sebbane et al. 2012).

Identifying the importance of obtaining alcohol levels in acutely intoxicated patients presenting to Emergency Departments as a diagnostic benefit to assist with treating this group of patients is yet to be seen in the literature. Gmel (2008) compared breath alcohol levels with blood alcohol concentrations and found minimal difference between them. Combined with the accuracy already identified in breath alcohol measurement compared with blood alcohol measurements there needs to be further research on the use of breath alcohol levels as a diagnostic tool (Gmel et al. 2008; Kaisdotter Andersson et al. 2015; Sebbane et al. 2012).

Acutely intoxicated patients can be some of the most difficult to manage and diagnose due to the effects of alcohol on the central nervous system (Dawood 2008; Donnelly, Kent-Wilkinson & Rush 2013; Snyder, Kivlehan & Collopy 2014). Donnelly, Kent-Wilkinson and Rush (2013) recommend the need to investigate all possible alternative diagnoses prior to diagnosing a patient with acutely alcohol intoxication as many other medical conditions can have similar symptoms that if not treated in a timely manner could be detrimental to the patient. However, treatment of acute alcohol intoxication varies between studies and authors. Research available on treatment on acute alcohol intoxication varies between active treatment and a conservative, observational approach.

The conservative approach to treating alcohol intoxication is observing these patients to ensure their safety. The identified literature does not support treatment with intravenous fluids unless the patient is otherwise clinically unwell (Hindmarch, Land & Wright 2012; Homma et al. 2018; Li, J, Mills & Erato 1999; Perez et al. 2013; Snyder, Kivlehan & Collopy 2014). Research would instead suggest intravenous fluids be administered when intoxicated patients are found to be suffering other complications such as hypotension or hypoglycaemia and not as a standard treatment approach (Homma et al. 2018; Perez et al. 2013; Snyder, Kivlehan & Collopy 2014). Knowing there are two schools of thought, Perez et al. (2013) identified that intravenous fluids are frequently administered to intoxicated patients despite lack of evidence and even states that intravenous fluid administration is neither discussed nor advocated as best practice in emergency medicine. Similarly Homma et al. (2018) conducted a study examining intravenous therapy (IVT) administration and length of stay and found IVT administration increased length of stay. The study recommended not administering IVT in uncomplicated alcohol intoxication, but instead to observe and monitor patients (Homma et al. 2018).

Conversely, other research recommends all intoxicated patients receive intravenous access and intravenous fluids (Donnelly, Kent-Wilkinson & Rush 2013; Morgan 2015; Vonghia et al. 2008). The reason to administer intravenous fluids is to counteract dehydration in this group of patients but also to dilute the alcohol in the blood system and to more quickly sober up the patient (Donnelly, Kent-Wilkinson & Rush 2013; Hindmarch, Land & Wright 2012; Homma et al. 2018; Morgan 2015; Perez et al. 2013; Vonghia et al. 2008).

Despite the two different approaches to treating and managing acute alcohol intoxication, the increased risks identified by Vonghia et al (2008) due to the pharmacological effect of alcohol on the body means observation is important. Without proper observation and monitoring the patient has an increased risk of vomiting while sedated, with the potential for aspiration and therefore an increased risk of a bacterial infection leading to a pneumonia or bronchitis. These implications then relate to the clinicians' choice of interventions in order to keep the patient safe.

Other forms of management for patients presenting with alcohol intoxication include blood testing, thiamine replacement, antiemetic's and electrolyte replacement (Donnelly, Kent-Wilkinson & Rush 2013; Morgan 2015; Mullins, Mazer-Amirshahi & Pines 2017; Snyder, Kivlehan & Collopy 2014; Verelst et al. 2012; Vonghia et al. 2008). Mullins, Mazer-Amirshahi and Pines (2017) conducted a study over a ten year period on patients presenting to the Emergency Department with alcohol related ingestion. They observed an increase in presentations and a corresponding increase in ordering diagnostic testing, however they noted a decrease in positive results from that testing (Mullins, Mazer-Amirshahi & Pines 2017). This would support other research that suggests minimal medical support is the best approach for these patients (Morgan 2015; Snyder, Kivlehan & Collopy 2014). Mullins, Mazer-Amirshahi and Pines (2017) identified the decrease in thiamine administration highlighting the low rates of thiamine deficiencies in the Emergency Department and in acutely intoxicated patients. Thiamine is used in the treatment and prevention of vitamin B deficiencies (Health Communication 2018; Pharmaceutical Society of et al. 2018). Health Communication (2018) produce Monthly Index of Medical Specialities (MIMS) medication guide and identified that clinical signs of thiamine deficiency only become evident after 2-3 weeks of inadequate thiamine intake. Snyder, Kivlehan and Collopy (2014) identify this point and suggest that unless a patient is a regular excessive drinker they should not require thiamine administration. Despite this evidence several academic articles suggest thiamine be administered in these cases with no evidence provided as to why (Donnelly, Kent-Wilkinson & Rush 2013; Verelst et al. 2012; Vonghia et al. 2008).

Intoxicated patients also present with an increased risk of aspiration from vomiting and being unable to maintain their own airway due to an altered conscious state (Donnelly, Kent-Wilkinson & Rush 2013; Snyder, Kivlehan & Collopy 2014; Vonghia et al. 2008). To assist in preventing vomiting and reducing nausea, antiemetic's are commonly administered to reduce vomiting (Verelst et al. 2012; Vonghia et al. 2008). Despite all the available interventions and diagnostic tools available within the Emergency Department, many sources suggest minimal intervention and promote providing a safe place for patients to naturally sober up and be discharged into a responsible person's care as the best management (Hindmarch, Land & Wright 2012; Homma et al. 2018; Morgan 2015; Perez et al. 2013; Snyder, Kivlehan & Collopy 2014).

The clinical treatment of patients is often physician led and identifying best practice guidelines were limited. Due to the lack of guidelines, most management plans are left to the individual clinician or that particular unit's policy (Hindmarch, Land & Wright 2012; Homma et al. 2018; Morgan 2015; Mullins, Mazer-Amirshahi & Pines 2017; Perez et al. 2013). Pelissier et al. (2014) identified the sensitive issue of intoxicated patients due to the medico-legal responsibility of physicians and the added pressure due to the environment of the Emergency Department and the time issues around patient dispositions. Donnelly, Kent-Wilkinson and Rush (2013) similarly identified the need for physicians to feel confident in their patient's condition when making a decision on discharge due to the effect of alcohol on the body and central nervous system. This highlights the need for efficient assessment and decision making skills within the Emergency Department for the best outcome of the patient. It is also important for nurses to know their role within the patient journey in the Emergency Department and that their assessment skills are at a satisfactory level to identify deterioration (Dawood 2008; Kelleher & Cotter 2009; Olson et al. 2013; Vonghia et al. 2008).

What does all this mean?

The literature that was selected to be included in this study was found by searching several journal databases and reviewing titles and abstracts before articles were selected to be read and analysed thoroughly. Figure 1 demonstrates the search requirements for journal articles to be included in this study.

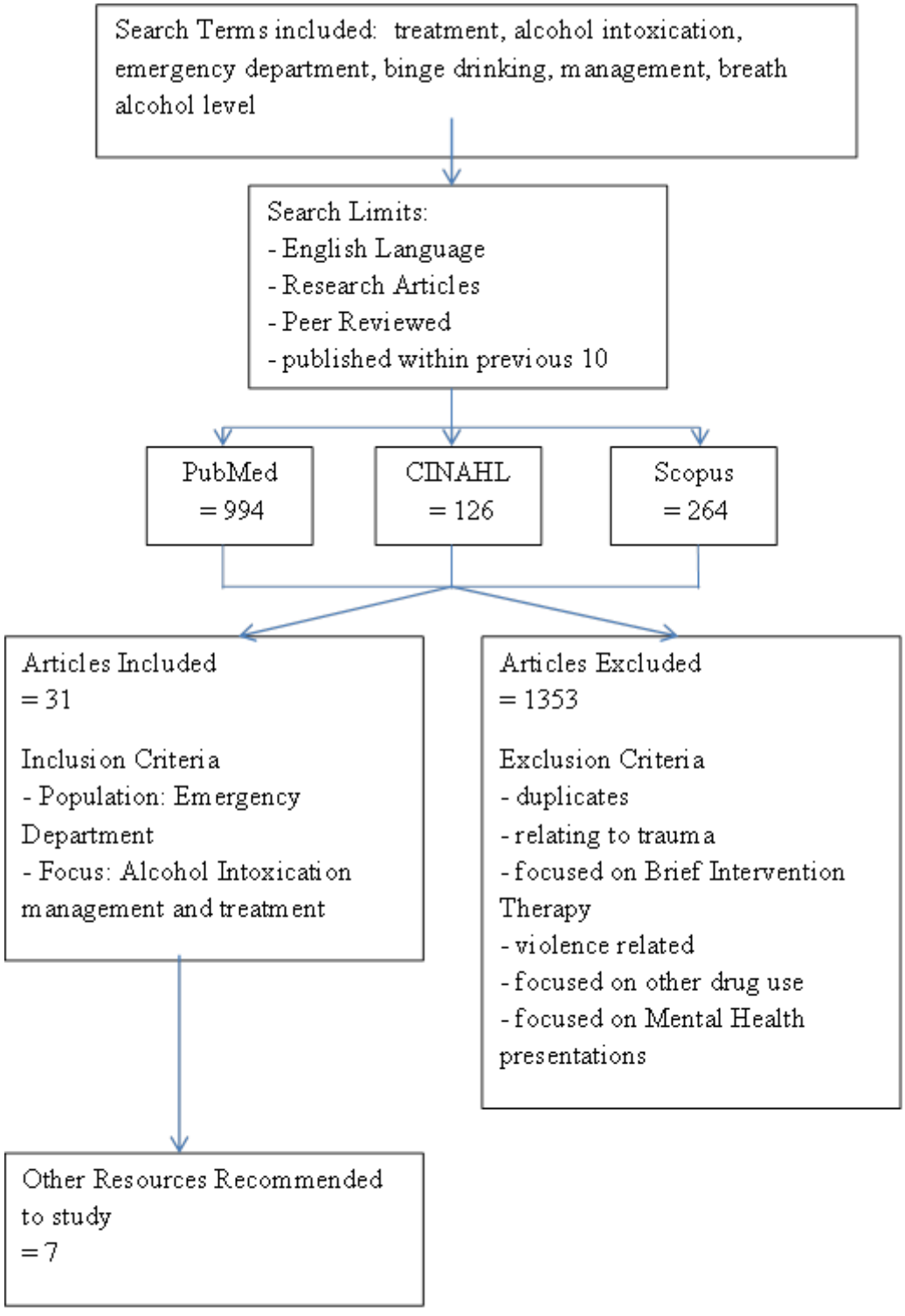

Figure 1: Literature Inclusion Flow Chart

From the literature available it can be seen that there are varying views and opinions on the best management of patients affected by acute alcohol intoxication and lack of guidelines. Despite many studies identifying the lack of evidence for administering intravenous fluids in acutely intoxicated patients (Hindmarch, Land & Wright 2012; Homma et al. 2018; Mullins, Mazer-Amirshahi & Pines 2017; Perez et al. 2013), just as many studies recommend the use of intravenous fluids to assist in diluting alcohol and treating dehydration (Donnelly, Kent-Wilkinson & Rush 2013; Morgan 2015; Vonghia et al. 2008). With pressures on Australian Emergency Departments to reduce patient treatment times and four hour targets (*Emergency department care 2016–17 Australian hospital statistics* 2017), there is a need for better guidance on the most appropriate and effective care for this group of patients.

Some of the intoxication management interventions being provided within the Emergency Department contribute to increasing length of stay and add minimal clinically relevant outcomes (Homma et al. 2018; Mullins, Mazer-Amirshahi & Pines 2017; Perez et al. 2013). With limited diagnostic tools for identifying the level of intoxication in patients it is interesting that there is minimal focus on breath alcohol analysers and their use within the Emergency Department (Gmel et al. 2008; Kaisdotter Andersson et al. 2015; Olson et al. 2013; Sebbane et al. 2012). This study aims to identify whether the current use of utilising a breath alcohol level measurement affects or has an influence on the interventions and length of stay of the patient in the Emergency Department.

Chapter 3: Method

Introduction

The purpose of this study is to identify the usage of breath alcohol testing for alcohol intoxicated patients within the Emergency Department and how it influences a patient's journey and length of stay in the facility. This was accomplished by examining the records of patient's that presented with alcohol intoxication, to identify the care and management they received during their visit to the Emergency Department. When considering the purpose of this study, an empirical quantitative study appeared to be the most suitable approach to obtain the findings to answer the study question. In order to answer the question it was vital to gain data from patients who had been treated at an Emergency Department for acute alcohol intoxication. The study was conducted within the Emergency Department of a large, acute tertiary teaching hospital. The data required to answer this question includes length of stay and clinical management of the patients and therefore needs to come from the record from that visit to the Emergency Department. Collating the data required for this study from the patient medical records allows minimal interpretation of data prior to analysis due to the quantitative approach being taken. However relying on the patient records to be present and provide enough information to make a conclusive interpretation requires adequate documentation being completed at the time of the patient episode, which is something the investigators do not have control over.

Description

A calendar year was identified and decided as the period of time for collecting data in order to cover all trends through seasons and events. The specific calendar year of 2016 was chosen to ensure consistency, as the study setting (the Emergency Department) in which the study was approved had changed documentation systems and computer programs during the 2017 calendar year. Examination of this calendar year of 2016 provided consistent data, ease of access and appropriate collection.

The data that needed to be collected was gathered from the Emergency Department Information System (EDIS) and physical patient medical records. Ethics approval was obtained from the state health system for the individual hospital where data collection was to be undertaken (Appendix 2) and also confirmed by the University of Adelaide Human Research Ethics Committee as the (Appendix 3).

Once ethics approval had been granted, the primary investigator identified potential episodes of care through the EDIS program by identifying patients who had the triage code of alcohol/drug substance misuse, as well as a discharge diagnosis code of alcohol intoxication. The decision to utilise these codes was to limit the patient cohort group to the primary treating condition of alcohol intoxication and to exclude trauma, mental health and other comorbidities such as complications of diabetes.

Inclusion Criteria

- presenting complaint of alcohol intoxication
- discharge diagnosis of alcohol intoxication
- patients 16years and older

Exclusion Criteria

- presented for traumatic injury
- mental health presentation
- complications from health comorbidity
- no alcohol intoxication found
- alcohol withdrawal symptoms and treatment

This identified 704 episodes of care. A request for patient medical records was completed and submitted for all 704 episodes of care. Of the requested files 623 were available and provided from

the medical records department. All medical files were examined by the primary investigator and thirty-three were excluded due to meeting exclusion criteria such as patients detained on Inpatient Treatment Orders for mental health admissions, patients cleared of alcohol intoxication and patients being treated for alcohol withdrawal.

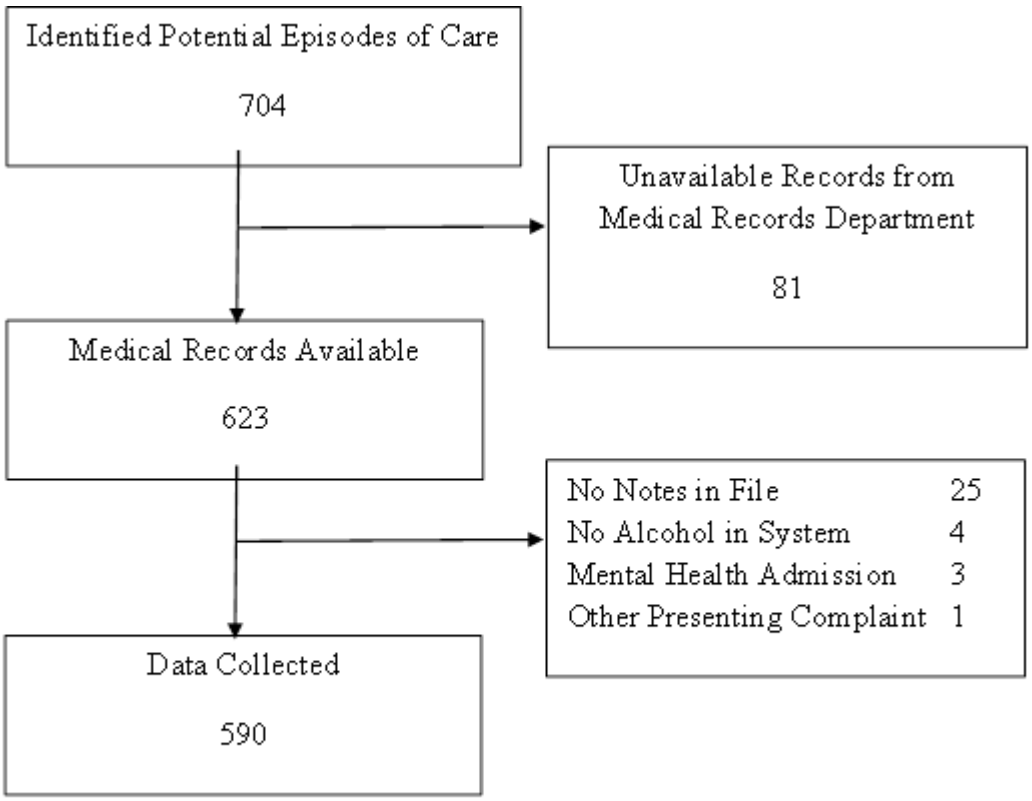

Figure 2: Data Inclusion Flow Chart

Ethical Review

According to the Hospital Human Research Ethics Committee (HREC), the form of data collection for this study was classed as a quality assurance and audit study and therefore deemed to be a low/negligible risk activity and did not need to go to the full ethics committees but could be approved by the chairperson out of session. It also did not require consent from patients prior to access of their case notes.

The data being collected from completed case notes required no patient contact or patient consent. The application included a letter providing background for the study, a study plan and a draft data collection sheet as per the requirement from the South Australia (SA) Health HREC. The curriculum vitae for each investigator as well as approval from the department heads in which the study would be taking place was also provide. Once all requirements were met the hospital health network research department granted ethical approval for the study. The letter of ethical approval from SA Health and the specific hospital was provided to the University of Adelaide Human Research Ethics Committee and accepted, enabling data collection to commence.

Once all data had been collected from EDIS and patient case notes, the patient unit record numbers were deleted and each encounter was allocated a new identifying number unique to the study. At no stage was the patient's name, date of birth, unit record number or other personal details viewed or discussed with any person other than the primary investigator doing the data collection. At all stages data was collected and stored on a password locked computer with only the primary investigator knowledge of the password. Only after the data was changed to include new identifiers for each encounter was the data shared with the other investigators.

Data gathering instruments/procedures

A data collection form was developed using Microsoft Excel 2013 (Appendix 4). Data collected included gender, age, postcode, presentation date and time, Australasian triage category, initial breath alcohol level (BAL), subsequent breath alcohol levels, intravenous fluids administered and total volume administered, thiamine administered, ondansetron (an anti-emetic) administered, discharge time and destination, and the total length of stay within the emergency department. Though volume of intravenous fluids was recorded, the doses of ondansetron or thiamine were not recorded, however standard practice for thiamine is 100milligram daily for five days and ondansetron is 4 to 12milligrams determined by severity of nausea and vomiting (Health Communication 2018; Pharmaceutical Society of et al. 2018).

Utilising the patient records that were available, each patient encounter for 2016 were identified and data was collected from EDIS and the medical records. This was entered into the Microsoft Excel

2013 spreadsheet. Initially medical case notes were searched for available data and inserted into the collection form. It was found that the case notes did not provide all the data wanted and so EDIS was relied on to complete the dataset. EDIS is a health care software program used in the hospital in this study. The data it provided that could not be found in the patient case notes included Australasian triage category, admission and discharge time, discharge destination and some personal details that may not have been available when the patient initially presented.

Though there was no need to double back and re-examine the data there was often the need to request further volumes of case notes for patients that may have had many encounters and therefore multiple case note files. A further 68 case notes were recalled in an attempt to gather all available encounters identified by the initial search on EDIS by coding. Due to the storage facility for case notes being off site to the hospital campus there were often delays in medical case notes availability. Therefore after the period of four weeks of data collection, it was decided the collection period to be complete and any notes unable to be provided during that time were not included in the study.

Validity and reliability review

To maintain reliability and reduce bias or distortion of the data, it was maintained that one investigator collected all data. As the study was an empirical quantitative study it was observational.

The investigator also utilised a data collection form which ensured the same data was collected from each participant and reduced bias on what data was or wasn't collected.

Through the study design alone the validity and reliability of this study was maintained because the data that was to be assessed and interpreted was from a primary source and was transcribed into a collection form and required no interpretation prior to analysis. This ensured an unbiased and consistent approach to the data and further analysis of the data.

Statistical analysis

Once data collection was complete the data was reviewed thoroughly and errors corrected within the Microsoft Excel 2013 spreadsheet. Data that needed to be corrected included coding for unknown or unavailable data, missing values and data that did not correlate with similar data. The refined data was then inserted into the Statistical Package for the Social Sciences (SPSS) version 25 for statistical analysis.

Initially tests for normality and homogeneity of variance were run. When comparing initial breath alcohol level against length of stay a significant positive skew was identified. To correct this a square root transformation of length of stay data was made to normalise the data and make it adequate for parametric testing (Pallant 2016). The square root of length of stay was utilised for values of statistical significance testing only. All other central tendencies relating to the length of stay were conducted on the actual data value of length of stay. The data was then thoroughly explored in relation to the research question in order to identify any significant statistical relationships between the data collected.

Initially data was reviewed in SPSS looking at frequencies, mean and medians to explore any obvious trends. Inferential statistical analyses were then analysed to find significant relationships between the data groups. This was to identify if the variables influenced each other and whether there were correlation between the two variables being tested. Parametric technique was utilised as mentioned above by normalising the data of length of stay (Pallant 2016). Independent-samples t-test was used to find the significant difference with continuous variables, with the relationship deemed significant with a p value result of less than 0.05 (Pallant 2016). T-tests were utilised to find relationships with length of stay, initial BAL and age. Similarly to identify significant relationships in categorical variables, chi-square tests were conducted with the relationship between variables deemed significant with a results less than 0.05 (Pallant 2016).Chi-square tests were utilised to identify a relationship with if a BAL occurred and gender with the other categorical variables.

It was then identified that further analysis was required for some of the continuous variable data that was collected including the number of BAL measurements conducted in the episode of care and length of stay. To calculate the significant relationship with continuous variables Pearson Correlation and one way analysis of variance (ANOVA) tests were conducted with significance in the correlation tests as less than 0.01 and 0.05 in the one way ANOVA.

Conclusion/summary on method

The question posed at the beginning of the study was how does recorded breath alcohol level influence the clinical management of an intoxicated patient and their length of stay in the Emergency Department? In order to answer this question data was collected from patients that had presented to the emergency department with alcohol intoxication.

A large tertiary Australian hospital in a metropolitan area was identified and ethics approval was granted to review a twelve month period of patient's presentations related to alcohol intoxication. A data collection form was created and the primary investigator utilised patient medical case notes and the emergency department computer program EDIS to gather data. The data collected was then analysed using SPSS for significant relationships between the data.

By analysing the significant relationships between the variables, any influencing factors on length of stay as well as the possibility of breath alcohol levels influencing clinical management for acutely intoxicated patients in the emergency department can be identified.

Chapter 4: Results

Introduction

The data collected in this quantitative study has been analysed using the statistical analysis program, Statistical Package for the Social Sciences version 25 (SPSS) and includes both demographic and presentation related data. The data was analysed to answer the research question and therefore not all relationships were examined.

Data Analysis

Data was manually collected retrospectively from physical patient records and a hospital computer database. The data was entered into a Microsoft Excel 2013 program spreadsheet designed as a collection form, see appendix 4. The data was then refined and inserted into the statistical analysis program SPSS for analysis. A total of 590 episodes of care were found to meet all inclusion criteria and were included for analysis.

Descriptive Analysis

Demographic Data

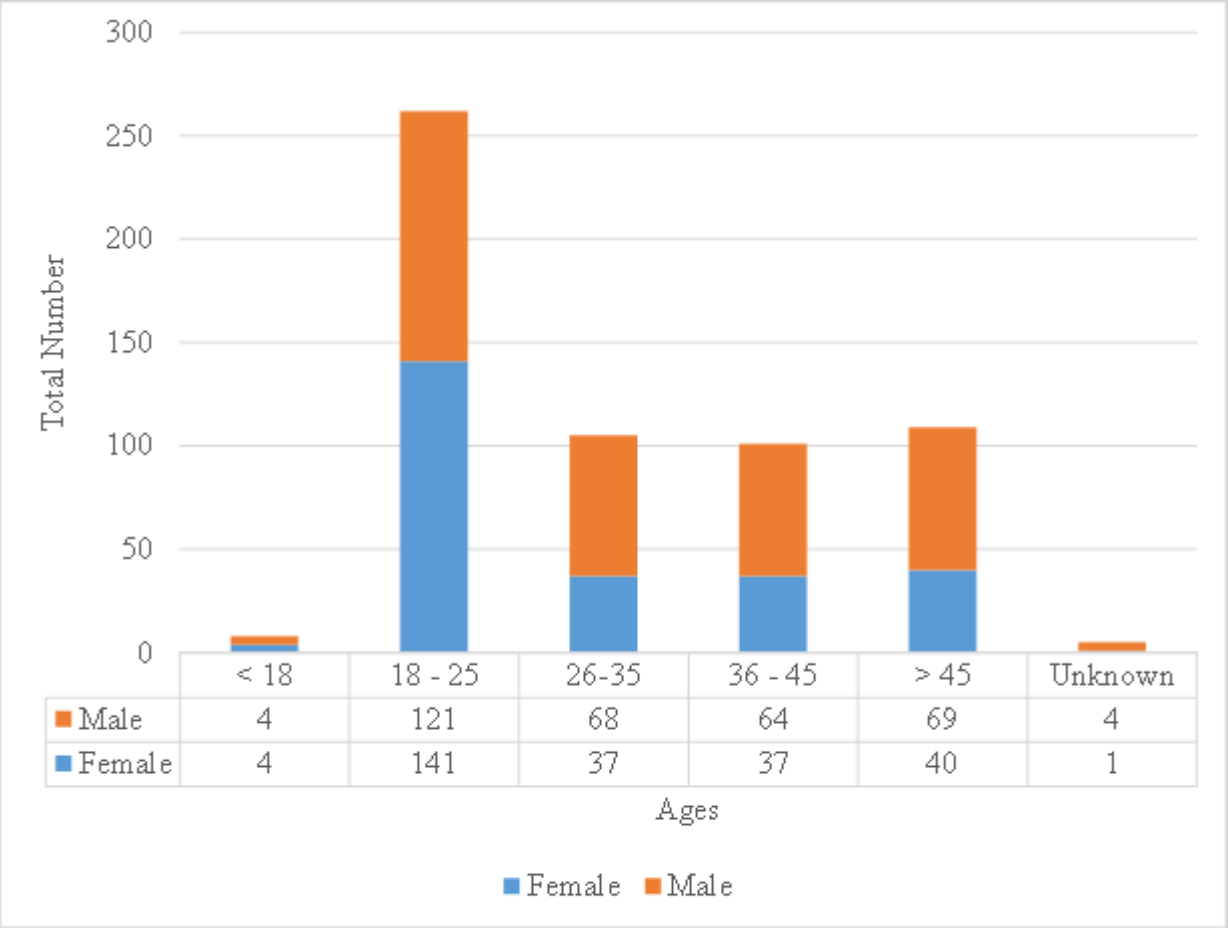

Figure 3 – Age with Gender Representation

Demographic data that was collected included gender, age and postcode. Postcodes of residential addresses were collected initially to consider if there was any stratification of results by geographical area, however no analysis was undertaken as it was felt there would be no significance to the research question and the research as a whole. Triage scores according to the Australasian Triage Scale were also collected but were not analysed due to the analysis not answering or being relevant to the research question.

Analysis of gender and age revealed 260 presentations were female (44%), 330 were male (55.8%) and 1 was unknown/missing data (0.2%). Ages for patients varied from 16 years of age to 81 years of age with several unrecorded ages (n = 5). The median age from the data was 27.5 years of age with a mean age of 32.03 years of age. Figure 3 shows the ages of all episodes grouped to demonstrate the spread across ages.

Breath Alcohol Level

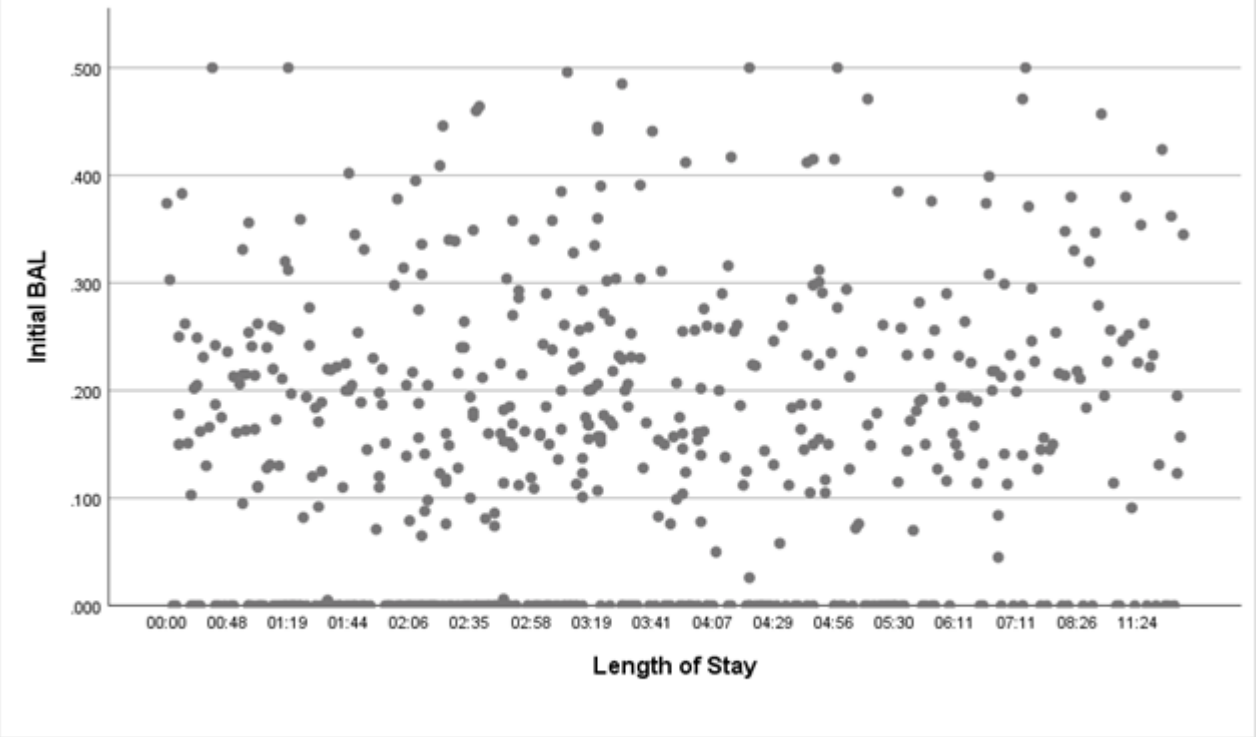

Figure 4 - Scatterplot displaying Initial BAL and Length of Stay Relationship

Figure 4 displays the relationship of length of stay and initial breath alcohol level (BAL) reading in a scatterplot graph. In the cases of BAL not being conducted or recorded the result was documented as 0.000. The 0.000 values have been included in this figure to demonstrate the spread of length of stay among the subgroup. Therefore on the scatterplot the patient group with no BAL recorded can be identified along the y axis in relation to their length of stay.

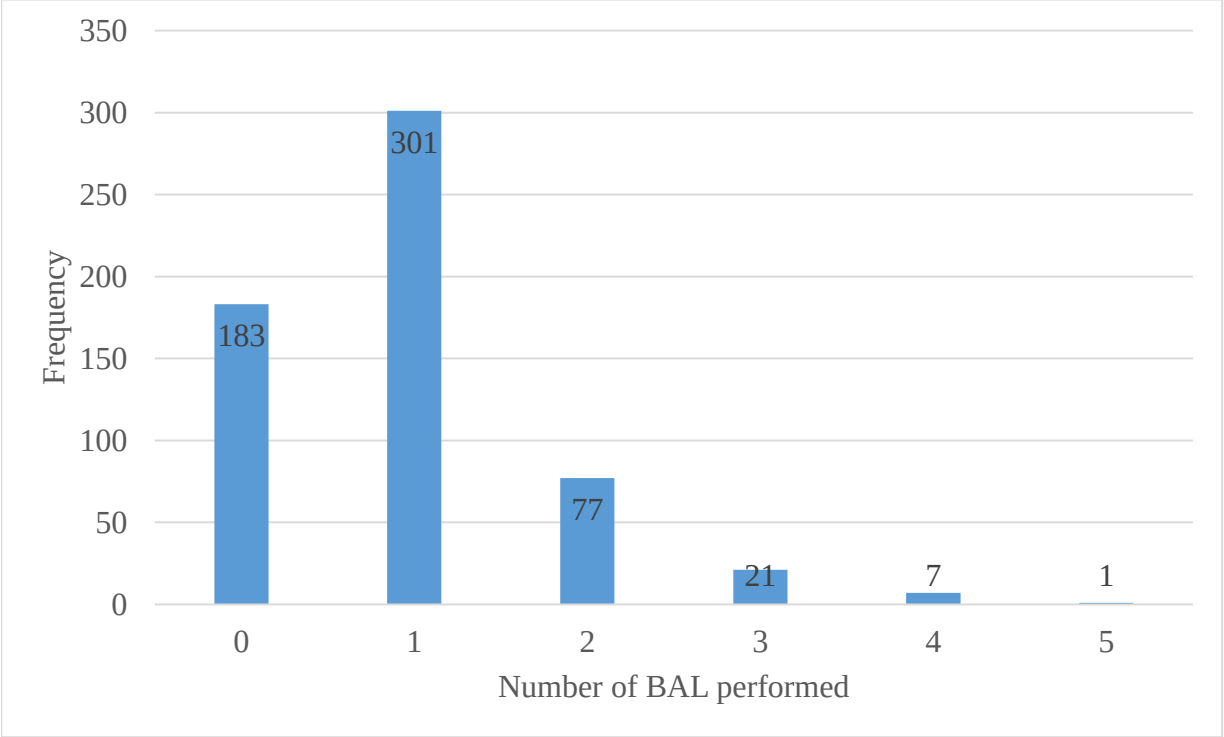

Figure 5 – Breath Alcohol Levels Performed

Breath alcohol level (BAL) measurements are central to this study, specifically whether they were performed and if they influenced the interventions provided and the patient's length of stay. Of 590 episodes of care 183 (31%) did not have a BAL recorded. Whereas 301 (50.9%) episodes of care provide only one BAL during the episode of care, and the maximum number of BAL conducted within one episode of care was 5. Figure 5 charts the number of BALs performed per episode of care.

Of those episodes of care that had one or more BAL performed, the mean BAL level was 0.219% with a median of 0.205%, and these are significant readings however did not guide treatment. When examining the initial BAL it was found that the lowest BAL recorded was 0.005% and the highest recordable BAL was 0.471%. There were also 5 BAL readings that were out of range on the BAL machine which measures up to a maximum of 0.49%, indicating a BAL greater than 0.5% or higher.

Length of Stay

Table 1 - Frequencies of Length of Stay and BAL

	Minimum	Maximum	Mean	Median	SD
Length of Stay	0.00	21.26	3.55	3.18	2.48
Initial BAL	0.005	Out of Range	0.219	0.205	0.098

Length of Stay was also important data to analyse due to relevance to the research question. The mean length of stay was 3.55 hours with a median of 3.18hours.

Interventions

Table 2 - Frequencies of Treatments

	Yes	No	Unknown	Mean	Median
Thiamine Administration	86 (14.6%)	504 (85.3%)	1 (0.2%)	-	-
Ondansetron Administration	101 (17.1%)	489 (82.7%)	1 (0.2%)	-	-
IVT Administration	189 (32%)	397 (67.2%)	5 (0.8%)	1489.3ml	1000ml

Thiamine was administered in 86 episodes of care which is 14.6% of all episodes of care. There was 1 episode of care missing data. No quantity was recorded as the dose is the same whether it

administered either orally or intravenously and it was not believed to change the analysis of this study.

Ondansetron was administered as an antiemetic in 101 (17.1%) episodes of care with missing data in 1 episode. As with thiamine, no quantity was recorded because administration could have been orally or intravenously and could have been administered by pre hospital services such as first aid or the ambulance service.

Intravenous fluids were administered to 189 (32%) episodes of care with 5 episodes of care missing data. The mean volume of intravenous fluids administered was 1489.3millilitres and the median volume was 1000millilitres. The type of intravenous fluid administered in each episode of care was not recorded nor examined.

Inferential Analysis

Parametric statistics were used to explore relationships between variables utilising chi square, t-test, crosstab, Pearson's correlation and one way analysis of variance (ANOVA) tests. For inferential analysis, length of stay was transformed via square root to ensure the variable conformed to parametric analysis.

Table 3 - Chi Square Results

	Gender F	Gender M	χ^2	p	BAL Y	BAL N	χ^2	p
Gender F					180	80	0.512	0.95
M					227	102		
IVT Y	90	99	0.120	0.205	119	69	0.021	0.032
N	167	230			286	111		
Thiamine Y	28	58	0.025	0.020	72	14	0.001	0.001
N	232	272			335	168		
Ondansetron Y	52	49	0.123	0.099	60	40	0.035	0.032
N	208	281			347	142		

Comparisons of relationships between dichotomous variables (gender, BAL, interventions) were tested using a Chi Square test.

When analysing gender with whether thiamine was administered a chi square test of independence indicated a statistically significant relationship (χ^2 = 0.025, p = 0.020) with males more likely to have thiamine administered. However gender was found to not having a significant relationship with whether a BAL occurred (χ^2 = 0.512, p = 0.95), ondansetron administration (χ^2 = 0.123, p = 0.099) and IVT administration (χ^2 = 0.213, p = 0.205) with the Chi-Square significance being greater than 0.05.

When comparing whether a BAL occurred with other variables using Chi-Square significant relationships were found with IVT administration (χ^2 = 0.035, p = 0.032) with those who provided a BAL measurement were less likely to receive IVT administration; whether thiamine was administered (χ^2 = 0.001, p = 0.001) with those who provided a BAL measurement were more likely to receive thiamine; and whether ondansetron was administered (χ^2 = 0.033, p = 0.031) with those who provided a BAL measurement were less likely to receive ondansetron administration.

Independent sample t-tests were conducted on the relationships between length of stay, initial BAL and age with the other variables from the data.

Table 4 - Independent Sample T-Test Results

		LOS (mins)			Initial BAL (g/210L)			Age (years)		
		Mean	SD	Statistic	Mean	SD	Statistic	Mean	SD	Statistic
Gender	F	109.6	38.61	t = -1.397	0.199	0.086	t = -3.508	30.18	13.848	t = -3.262
	M	114.1	39.82	p = 0.163	0.234	0.105	p = 0.001	33.99	14.193	p = 0.001
IVT	Y	121.2	37.44	t = -3.812	0.219	0.115	t = -0.024	31.67	13.654	t = 0.759
	N	108.2	39.31	p = 0.00	0.219	0.091	p = 0.981	32.63	14.425	p = 0.448
Thiamine	Y	131.1	47.58	t = -4.115	0.271	0.125	t = -4.812	40.16	13.249	t = -5.722
	N	108.93	36.83	p = 0.00	0.208	0.088	p = 0.00	30.95	13.877	p = 0.000
Ondansetron	Y	113.58	34.05	t = -0.396	0.174	0.088	t = 3.975	26.30	10.540	t = 5.796
	N	111.87	40.35	p = 0.692	0.228	0.098	p = 0.000	33.53	14.492	p = 0.000
BAL Measured	Y	115.1	41.02	t = -2.978				33.04	14.316	t = -1.846
	N	105.4	34.53	p = 0.003				30.70	13.697	p =0.650

As shown in table 4, significant relationships were identified with length of stay and whether a BAL occurred ($t = -2.978$, $p = 0.003$) with those who had a BAL measurement having a longer length of stay; whether IVT was administered ($t = -3.812$, $p = 0.000$) with those who received IVT administration having a longer length of stay; and whether thiamine was administered ($t = -4.115$, $p = 0.000$) with those who received thiamine administration having a longer length of stay.

When comparing the initial BAL value and the other variables using t-tests significant relationships of less than 0.05 significance was found with gender ($t = -3.508$, $p = 0.001$) with males having a higher BAL measurement, whether thiamine was administered ($t = -4.812$, $p = 0.000$) with higher BAL measurements with thiamine administration; and whether ondansetron was administered ($t = 3.975$, $p = 0.000$) with higher BAL measurements in those who did not receive ondansetron administration. However there was no significant relationship with t-test on initial BAL and whether IVT administered with a significance of 0.981 ($t = -0.024$).

T-test was also utilised to compare age with the other variables and was found that a significant relationship existed between age and whether thiamine was administered ($t = -5.722$ $p = 0.000$) with older patients receiving thiamine; whether ondansetron was administered ($t = 5.796$ $p = 0.000$) with older patients not receiving ondansetron; and gender ($t = -3.262$ $p = 0.001$) with males having an older average age. Alternatively age and whether IVT was administered resulted in a t-test significant of 0.448 ($t = 0.759$) demonstrating no significant relationship between them.

Pearson's correlation was used to test the relationship between length of stay and total IVT volume administered and length of stay and initial BAL. Length of stay and total IVT volume administered resulted with $r = 0.122$ and $p = 0.097$ when IVT volume increase the length of stay increases; length of stay compare with initial BAL with $r = 0.066$ and $p = 0.193$ when initial BAL increases the length of stay increases; and initial BAL and IVT volume resulted with $r = 0.170$ and $p = 0.069$ when initial BAL value increases the volume of IVT administered increases. Age was also examined with these variables using Pearson's correlation with results showing with initial BAL r =

0.212 and p = 0.000 when age increases the initial BAL value increases; length of stay r = 0.161 and p = 0.000 when age increases length of stay increased; and with IVT r = -0.101 and p = 0.173 when age increases the total IVT volume decreases.

One-Way Analysis of Variance (ANOVA) was used to determine if significant relationships existed between number of BAL conducted and total IVT volume administered, and number of BAL conducted and length of stay (table 5).

Table 5 - One Way ANOVA results

	IVT Volume					Length of Stay (square root)				
Number of BAL's performed	N	Mean	SD	Levene's Test	Sig	Number	Mean	SD	Levene's Test	Sig
0	68	1400	679.77	0.440	0.388	183	105.07	34.39	0.407	0.000
1	81	1488.27	718.95			301	107.40	38.32		
2	29	1655.17	720.90			77	135.12	41.82		
>3	9	1638.89	857.96			29	145.53	34.53		

Both ANOVA tests complied with Levene's test of homogeneity of variances with no violation with the test of homogeneity results being greater than 0.05 (Pallant 2016). The ANOVA significance for number of BAL and total IVT volume administered was $p = 0.388$, $F(3, 183) = 1.014$ indicating no statistical significance. Alternatively the number of BAL conducted and the length of stay was found to be significant with a result of $p = 0.000$ and $F(3, 586) = 21.124$. The eta square for this relationship is 0.662 indicating the number of BALs has a large effect on length of stay.

Conclusion

The results presented have been collated from statistical testing utilising the computer program SPSS. After statistical analysis of the data collected and identification of significant relationships between the data, clinical significance must be considered. The significant relationships between interventions and whether a BAL occurred and length of stay is of particular interest to explore in the coming chapter of the discussion.

Chapter 5: Discussion

Introduction

In Australian society alcohol consumption is considered a norm and provides a basis for socialising with others (Dawood 2008; Donnelly, Kent-Wilkinson & Rush 2013). It is when this consumption turns to over indulgence that there are detrimental effects on the health care system and emergency services (Dawood 2008; Donnelly, Kent-Wilkinson & Rush 2013; Havard, Shakeshaft & Conigrave 2012; Levinson et al. 2017; Mullins, Mazer-Amirshahi & Pines 2017; Snyder, Kivlehan & Collopy 2014). Alcohol related overall hospital costs for 2004-05 in Australia being $833.1million (Collins & Lapsley 2008), there are questions around the interventions that these patients are receiving and whether Emergency Departments are managing to comply with Australia's current healthcare target of four hours in the Emergency Department (*Emergency department care 2016–17 Australian hospital statistics* 2017). With constant attention on the management of patients in Emergency Departments and concerns about overcrowding and delayed transfers (Klein et al. 2017; Scott et al. 2017), length of stay became an important part of this research.

This study was designed and conducted to identify patients presenting to an Australian Emergency Department over a twelve month period with acute alcohol intoxication. Each presentation was then reviewed and information collected on length of stay and interventions provided. It was expected that the analysis of this data would reveal how a recorded Breath Alcohol Level (BAL) influences the clinical management of an intoxicated patient and their length of stay in the Emergency Department.

Study Findings

The focus of the study question was whether a BAL measurement affected length of stay for the acutely intoxicated patient. It was through comparing the length of stay and whether a BAL occurred using independent sample t-tests that a significant relationship was identified. However

despite identifying that having a BAL recorded in the Emergency Department increases patient length of stay, is not the only variable in the patients Emergency Department experience. This discussion will examine all variables measured and their relationships with each other in an attempt to identify the key factors that affect an acutely intoxicated patient's journey through the Emergency Department.

Length of stay was a key element in this study. The mean length of stay in this study was 3.55hours with a median of 3.18hours, both these values complying with the Australian healthcare target of 4hours in Emergency Department (*Emergency department care 2016–17 Australian hospital statistics* 2017). This indicates that the acutely intoxicated patient is on average discharged within Australian Emergency Department standards, however the reasons why those patients who did not meet the average time and were discharged after the mean and median time within Emergency Department needs investigating. This study identified the maximum time in Emergency Department for a patient with acute alcohol intoxication was 21.26hours, displaying a significant breach of the four hour target standard. When comparing length of stay with the different interventions options, varying degrees of significance were found.

Similar to the literature review in this study, the data demonstrates two different schools of thought on interventions of alcohol intoxication. The first being conservative management of the intoxicated patient consisting of observation and discharging when safe (Hindmarch, Land & Wright 2012; Homma et al. 2018; Li, J, Mills & Erato 1999; Perez et al. 2013; Snyder, Kivlehan & Collopy 2014). The data from this study showed the majority of episodes of care did not receive interventions as 67.2% of episodes of care did not receive IVT, 85.3% of episodes of care did not receive thiamine and 82.7% of episodes of care did not receive ondansetron.

The second school of thought evident in literature is to aggressively treat alcohol intoxication with the intention to accelerate the sobering up process and discharge the patient quickly (Donnelly, Kent-Wilkinson & Rush 2013; Morgan 2015; Vonghia et al. 2008). However it is evident from the data analysis in this study that providing interventions to an acutely intoxicated patient does not necessarily decrease their length of stay. In the case of thiamine or IVT being administered it was

actually the opposite as that it increased the length of stay of those who received these interventions. Ondansetron administration did not increase nor decrease length of stay for that group of patients who it was administered to.

Thiamine

Thiamine is utilised in the treatment of vitamin B deficiencies most commonly seen in chronic alcohol users (Health Communication 2018; Pharmaceutical Society of et al. 2018). Snyder, Kivlehan and Collopy (2014) suggested that in the acutely intoxicated patient who does not have a history of regular alcohol consumption administration is not necessary, however in this study data was not collected on past medical history for each episode of care. Therefore it could be that some of the episodes of care included were for acute on chronic alcohol intoxication. This could account for the 101 (17.1%) of episodes of care that thiamine was administered. Of this group that had thiamine administered during their episode of care, a greater number were male, the mean age was higher, and they were more likely to have provided a BAL which was higher. This study also identified a significance in the length of stay in this group. It would be speculation but the increased length of stay could be due to providing extra services and supports for possible withdrawal or dependence treatment.

Ondansetron

The administration of ondansetron could be argued to be a symptom treatment option rather than treating alcohol intoxication due to its purpose of reducing vomiting and nausea and therefore minimise the risk of aspiration (Health Communication 2018; Pharmaceutical Society of et al. 2018; Verelst et al. 2012; Vonghia et al. 2008). This would provide reasoning as to why ondansetron administration was the only intervention that did not have an effect on length of stay for those it was administered to. Ondansetron was administered in 101 (17.1%) episodes of care, there was no significant relationship to gender or length of stay. An interesting point with the significant relationship ondansetron administration has with initial BAL is that the episodes of care that received ondansetron had a lower mean BAL compared to those who did not receive ondansetron. This is surprising when it is expected that intervention is administered to those with a higher BAL. However this could be explained again by the use of ondansetron as a symptom controller rather

than a treatment for high BAL. Ondansetron was also administered more often to the younger demographic of this study group with a mean age of 26.3years old receiving ondansetron compared to a mean age of 33.53years old not receiving ondansetron. It is possible that patients who are younger have a lower tolerance to alcohol, hence presenting with lower BALs and vomiting/nausea.

Intravenous Therapy

Probably one of the most debated and utilised interventions in acute alcohol intoxication is intravenous fluid administration. Many studies have been conducted to identify the benefits of IVT administration in alcohol intoxication and all failed to identify any benefits and recommend against its use (Homma et al. 2018; Li, J, Mills & Erato 1999; Perez et al. 2013). Despite this, much literature is available recommending its use as part of best practice (Donnelly, Kent-Wilkinson & Rush 2013; Morgan 2015; Vonghia et al. 2008). With conflicting literature available to clinicians it could be understood why practice is inconsistent. This study also identified this lack of consistency in practice with the most obvious example being that no significant relationship was found between initial BAL value and IVT administration. If the reason to administer IVT is to sober a patient more quickly, then this would support literature which is in support of IVT administration (Donnelly, Kent-Wilkinson & Rush 2013; Morgan 2015; Vonghia et al. 2008), then it would be expected that the higher the initial BAL reading the more likely the patient is to receive IVT. However this is not the case in this study. Nevertheless this study found IVT administration was more likely if a BAL reading was taken and the length of stay increased with IVT administration occurring. This could also be viewed as disproving the studies promoting IVT administration as a way to treat and discharge patients quicker as the relationship between IVT administration and length of stay obviously does not trend in that direction in this study.

Breath Alcohol Level

The other key element for this study was BAL, which is used as an objective measure of intoxication in patients who appear to be under the influence of alcohol (Gmel et al. 2008; Kaisdotter Andersson et al. 2015; Olson et al. 2013; Sebbane et al. 2012). In this study it was recorded whether a patient provided a BAL or not, how many BAL's were provided in that episode of care, and the initial and final reading provided. It was not recorded if a patient was unable to

provide a BAL due to their condition or refused a BAL. Of the 590 episodes of care 183 (31%) did not provide a BAL and 407 (69%) did provide a BAL, and it is of interest to speculate on the possible reasons why one third of all presentations would not have a BAL measured. It could be assumed some patients would refuse to provide a sample of their breath, whereas some may be unable to due to their inebriation and the inability of follow instructions, however it could also be due to clinician preference or decision not to undertake a BAL measurement. Future research could examine these theories further and explore clinicians reasoning behind BAL measurement or not. Of those who provided a BAL the mean initial BAL was 0.219% with a median of 0.205%, the smallest reading was 0.005% and the largest was unrecordable on the machine being used indicating a reading greater than 0.500%. Within the literature available BAL readings are not discussed as a diagnostic measure in which physicians use to treat alcohol intoxication (Gmel et al. 2008; Sebbane et al. 2012). In this study it could be argued it is a similar finding as 301 (50.9%) of patients had one BAL measurement during their ED stay and 106 (18%) had more than one BAL. It could be suggested that if a BAL is conducted for diagnostic purposes and to guide interventions for the patient then a follow up BAL would be necessary to gauge the response to interventions however this did not appear to occur in the period of this study with only one quarter of those who had an initial BAL measurement having subsequent BAL measurements.

When identifying whether having a BAL measurement guided interventions in the acutely intoxicated patient, this study showed having a BAL performed increased the likelihood of having Thiamine, Ondansetron or IVT administered. This would coincide with the suggestion from Gmel et al. (2008) and Sebbane et al. (2012) that conducting a BAL can optimise interventions and management of acute intoxication. However when considering the BAL as a diagnostic tool as literature suggests, analysis of the results from the BAL should dictate interventions and management of the patient, however this is not seen as the case in this study. Examining the episodes of care that had an initial BAL recorded it can be seen that a statistical relationship exists with the BAL level and thiamine being administered and ondansetron not being administered. However there was not a significant relationship between initial BAL and whether IVT was administered ($p = 0.981$). Nevertheless this is clinically significant as the mean BAL of both groups who did or did not receive IVT was 0.219%. Though this BAL value indicates BAL was not influential in IVT administration some consideration could be inferred to the symptoms displayed

by the patients in determining interventions. Similarly the relationship between the initial BAL and the total volume of IVT administered showed a significance of 0.069 indicating no statistical significance, suggesting BAL did not influence the volume of IVT administered. This links back to the theory presented in the literature review of this study that there are two different schools of thought for treating the acutely intoxicated patient, one being active aggressive treatment and a more observational approach.

Demographic Data

Despite a lack of literature examining the demographics of patients presenting to Emergency Departments with alcohol intoxication, this study found some interesting trends with the data collected on age and gender. Though the demographic data collected in this study does not relate directly to the research question, it adds to the clinical picture and can provide further background to the areas of future research.

Age

The mean age for alcohol intoxication presentations at this study setting was 32.31 with a median of 28. The youngest presentation was 16 years old and the oldest was 81 years old. When comparing age with the possible interventions it showed no significant relationship existed between age and if a BAL was measured or IVT administration or total IVT volume. However a significant relationship was found with age and thiamine administration, ondansetron administration, initial BAL value and length of stay. These significant relationship identified older patients more likely to have thiamine administered, younger patients more likely to have ondansetron administered, the older the patient the higher the BAL and the older the patient the longer the length of stay.

There are common social beliefs that the youth are a burden on society with regards to alcohol intoxication and binge drinking (Callaghan et al. 2014; Donnelly, Kent-Wilkinson & Rush 2013; Keatley et al. 2017), however the data from this study shows with a mean age of 32.31 that this is perhaps misguided. Interventions were also not aimed at one end of the age spectrum. The mean age for patients receiving thiamine was 40.16 years old with those not receiving thiamine being 30.95 years old. This would suggest that older patients were more likely to receive thiamine which is

supported with the data of this study. One suggestion could be that within the older age group there were more patients who were chronic alcohol users or had known vitamin B deficiencies which would indicate the need for thiamine administration (Health Communication 2018; Pharmaceutical Society of et al. 2018; Snyder, Kivlehan & Collopy 2014). However this is only speculation as this study did not collect data on past medical history or the number of chronic alcohol users who presented with acute alcohol intoxication.

Conversely to thiamine administration, ondansetron administration was more likely in younger patients. As ondansetron is a symptom reliever, in that it reduces nausea and vomiting rather than treating alcohol intoxication (Health Communication 2018; Verelst et al. 2012; Vonghia et al. 2008), it may be speculated that the younger age group had worse symptoms of vomiting due to reduced exposure to alcohol compared to their older counterparts. The Australian Bureau of Statistics (2009) reports high rates of drinking alcohol in men in the age bracket of 45 to 54 years old and women in the age bracket of 35 to 54 years old. This report did not identify if this drinking was considered dangerous drinking levels. Similarly Haberkern, Exadaktylos and Marty (2010) found a higher presentation rate of alcohol intoxication in the age group of 35 to 45years of age.

Similarly when comparing age to initial BAL reading the Pearson Correlation is 0.212 indicating the older the patient the higher the BAL reading with the strength to the relationship being small (Pallant 2016). This indicates that the youth in society are not presenting with exceedingly high BAL in Emergency Departments compared to older patient's presenting acutely intoxicated. However this study does not identify symptoms of the patients and the potential of alcohol dependence and tolerance is possible in the older age group (Haberkern, Exadaktylos & Marty 2010; Vonghia et al. 2008)

Gender

The other demographic that was examined in this study was gender. Gender differences for alcohol intoxication were not significant, with females accounting for 260 (44%) of presentations and males accounting for 330 (55.8%) of presentations. This does not correlate with data from Stewart et al. (2014) who found an increased presentation of male participants. The Australian Bureau of

Statistics (2009) also found in their research that there was a greater proportion of males participating in risky drinking habits across all age groups when compared to the female population. There was one unknown gender for the missing 0.2% of data. Gender did not have the significant impact on management or interventions like age did. When comparing gender for significant statistical relationships, a significant relationship was not found with length of stay, BAL measurement, ondansetron administration or IVT administration. It was found that a significant relationship existed between gender and initial BAL reading and thiamine administration. The independent sample t-test of initial BAL and gender resulted in a 2 tailed significance of 0.001 with the mean BAL for females being 0.199% and males 0.234%, indicating that men consumed a larger quantity of alcohol which is supported by the Australian Bureau of Statistics report on risky drinking (2009). The other results showing a significant statistical relationship was with thiamine administration showing 28 out of 260 females received thiamine whereas 58 out of 330 males received thiamine with a 2 tailed significance of 0.025, indicating that men are more likely to receive thiamine in this study which could be reflective on the data in the Australian Bureau of Statistic report (2009) that males drink more alcohol more often.

These demographic results show trends from this study setting rather than provide evidence supporting the study question on interventions and management of alcohol intoxication with the focus on BAL readings and length of stay. The demographic results are not conclusive or related to the research question though provide background to the study setting and possible future research. Though the data on demographics is not something this study was looking for it raises important questions about alcohol in society and was interesting to discover throughout the study.

Study Limitations

This study has some limitations relating to the data that was collected. This study was retrospective and the data was collected from patient records from the previous calendar year. Consequently, data regarding clinical decision making was not collected nor examined, as such data would need to have been collected from detailed medical notes which may not have been completed or may not explain clinical decision making reasons. This makes it difficult to draw conclusions as to why some patients' interventions were of a certain way. In order to collect this data the study would have most

likely need to be conducted in real time with medical personnel documenting decisions especially for the study.

Another limitation was that potential episodes of care were identified by having the triage diagnosis code of alcohol/drug substance misuse, as well as a discharge diagnosis code of alcohol intoxication. This relied on the triaging nurse correctly identifying alcohol intoxication rather than entering another triage diagnosis code such as psychosocial or a neurological code such as altered conscious state. Conversely the treating and discharging doctor also needed to discharge with the diagnosis code of alcohol intoxication rather than another diagnosis code such as social problem. Alternatively a nurse could have entered a discharge diagnosis code such as left before treatment completed if the patient left without notifying staff. For these reasons it is highly likely some episodes of care that would have met all the other inclusion criteria were missed due to coding.

One factor that affects length of stay for all patient's in the Emergency Department was not mentioned nor examined in this study. This is Emergency Department overcrowding and bed block. When considering the four hour targets set for Emergency Departments some consideration must be given for the journey through Emergency Department and factors that may impact that such as access block (Scott et al. 2017). This study does not reflect on the time of day or the busyness of the Emergency Department for the patients presenting with alcohol intoxication. The impact on this study is that the length of stay for the patients commences when the patient is triaged and is completed on discharge or admission onto a ward. This means the duration of waiting time before being seen and treatment commencing is included in length of stay and therefore may extend the length of stay data.

Due to there being limited guidelines on the treatment of intoxicated patients in this study setting of Emergency Department, it is not possible to compare if what interventions are occurring is best practice or complies with policy and procedure. The location of this study did have an organisation wide instruction for alcohol intoxication (Appendix 4) however the focus is on patient safety and potential alcohol withdrawal rather than intervention and management guidelines. This limits this

study as it does not provide an underlying guideline on what appropriate intervention and management should be occurring for this group of patient's.

One area that was not examined in this study but often is linked with acute alcohol intoxication is alcohol withdrawal. Though the discussion suggests instances where there could be chronic alcohol users within the study there was no evidence collected to corroborate this and therefore is speculation. Nevertheless the use of BAL in alcohol withdrawal and chronic alcohol users is seen as a requirement and does not impact what this study is trying to identify.

Implications for Clinical Practice

Something taken from all the varying data in this study is that despite being only one site and over a one-year period there is significant variation of practice in the treatment of alcohol intoxication. As reported in the literature there appears to be two approaches when treating the acutely alcohol intoxicated. These are observing with minimal intervention and active aggressive treatment to assist in sobering up the patient (Donnelly, Kent-Wilkinson & Rush 2013; Hindmarch, Land & Wright 2012; Homma et al. 2018; Li, J, Mills & Erato 1999; Morgan 2015; Perez et al. 2013; Snyder, Kivlehan & Collopy 2014; Vonghia et al. 2008). Combined with the results from this study it is suggested that having a policy or procedure to assist in guiding clinicians in the treatment of intoxicated patients could be beneficial to provide consistent and evidence based practice. Though this site does have an organisational wide instruction it is not informative on the appropriate interventions that should be provided and when.

This study provides evidence favouring conservative treatment to reduce length of stay. Receiving interventions did not decrease length of stay in this study and therefore when looking purely at the impact on length of stay and the four hour National Emergency Access Target, it is not beneficial to provide interventions to discharge the patient earlier (*Emergency department care 2016–17 Australian hospital statistics* 2017; Scott et al. 2017). Currently in this study setting it can be seen that no guidelines or procedures were being used to guide interventions as there is no common treatment method obvious noted in the study. It appears that each individual clinician decides the

management on the patient presentation, which is reflective of the organisational wide instruction provided in this setting for alcohol intoxication.

Another theme for this study was the use of BAL in patient care. A consideration for clinical practice is if it is beneficial to conduct a BAL when patients present to Emergency Department with a suspicion of acute alcohol intoxication. A BAL is beneficial when utilised to identify alcohol intoxication and as Donnelly, Kent-Wilkinson & Rush (2013) state, it can assist in ruling out other potential diagnosis due to the symptoms the patient is presenting with. It would appear in the data from this study that conducting a BAL only encourages interventions and in the case of thiamine, ondansetron and IVT it was more likely to be initiated if a BAL was conducted and in turn increase length of stay. With this being the case it would suggest a BAL does provide a definitive diagnosis but is also a catalyst for initiating interventions which may be unnecessary.

With no standard practice nor protocols and guidelines for the treatment of acute alcohol intoxication it is more than likely patients will continue to have *ad hoc* interventions dependent on the clinicians personal experience, training and belief. This is contrary to the requirement for clinicians be led by best evidence based practice.

Recommendations for further research

When examining the data it can be seen that 301 (50.9%) of all patients received only one BAL recording. When considering the clinical significance of this it raises the following questions. If a BAL is a tool of measurement should it not be performed again after treatment or intervention to establish effect and improvement in patient condition? In order to consider this the number of BAL performed was compared to the length of stay using One-Way Analysis of Variance and a significant relationship was seen. However when conducting the same analysis on the number of BALs conducted and the total IVT volume administered it was found not to have a significant relationship. It could be assumed that the more BAL's conducted the longer the patient would be in the Emergency Department but if the number of BALs do not indicate a greater volume of IVT for the patient what other interventions were being assessed by conducting further BALs? Another consideration that this study did not examine was who decides when a BAL is conducted. It is

obvious from the data that not every acutely intoxicated patient provided a BAL but why is this so and what is the clinical reasoning behind conducting a BAL? This is one question that this study is unable to answer but requires further thought on the relevance to current clinical practice and future research.

Further research would be beneficial in the diagnostic effect of BAL and clinician's reasons behind conducting a BAL. A qualitative study could be useful in this area examining clinician's views and opinions on why do a BAL, why they wouldn't do a BAL and what guides their interventions in acute alcohol intoxication management. Combining this sort of qualitative study with an examination of clinical decision making for the acutely intoxicated patient could provide evidence to develop guidelines and policies for this area.

Conclusion

The research question was "How does a recorded Breath Alcohol Level influence the clinical management of an intoxicated patient and their length of stay in the Emergency Department". This study showed that having a BAL measurement does have an effect on the length of stay in the Emergency Department, increasing length of stay significantly. However the value of the first BAL does not have an effect on length of stay. This conflict of having a diagnostic test done that influences the length of stay but the result of that test does not, is not the only instance in this study that demonstrates conflicting care and inconsistency.

Throughout this study inconsistencies were prevalent with treatment and management of this group of patients. Inconsistency in treatment of intoxicated patients was initially highlighted in the literature review when it was noted that clinicians and academics had differing opinions on what was the best method of interventions for the intoxicated patient. Perez et al. (2013) most clearly identified the frequent use of IVT in intoxicated patients with the lack of evidence behind this practice. The results from this study demonstrated that this was also the case in the study setting showing that IVT was the most common intervention provided however BAL readings did not influence when it was administered nor the volume that was administered.

This study also demonstrated that though a BAL was obtained in this study setting the readings being provided were not guiding interventions. This brings a significant clinical question to the forefront of why conduct a test if the result is not going to provide direction on treatment and management. This was particularly evident with length of stay and IVT administration.

Though this study answers the basic question of does a breath alcohol level affect length of stay in an Emergency Department it also raises a lot of questions and contradictions which may lead to further research and development of policy and procedure.

This study demonstrates the need for active policy making in Emergency Departments to ensure unbiased treatment of the acutely intoxicated patient. With varying results in length of stay and intervention options it can be seen that there is no universal management in this study setting and therefore patients are at the disposition of their treating clinician. With more research in this area a conclusive management plan could be created ensuring patient safety and essential care requirements for this group of patients.

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Appendices

Appendix 1 Organisation Wide Instruction for Study Location

CENTRAL ADELAIDE LOCAL HEALTH NETWORK

CALHN: EMERGENCY DEPARTMENTS	
Alcohol Intoxication – Pathway for Patients Presenting to the Emergency Department	CALHNPr: OWI-03863 CLINICAL / CLINICAL PROTOCOLS /

1. PROCEDURE INTENT

Pathway for patients presenting to the Emergency Department (ED) with alcohol intoxication.

2. SCOPE

Emergency Department Clinicians

3. PROCEDURE DETAIL

See Appendix 1 – Alcohol Intoxication Pathway Flowchart

4. DEFINITIONS / ACRONYMS

ADIS – Alcohol and Drug Information Service
AWS – Alcohol Withdrawal Scores
DACAS – Drug and Alcohol Clinical Advisory Service
DACLS – Drug and Alcohol Clinical Liaison Service
DASSA – Drug and Alcohol Services of South Australia
ED – Emergency Department

5. SUPPORTING MATERIAL

5.1 Appendices

Appendix 1 – Alcohol Intoxication Pathway Flowchart

Appendix 2 – Estimating the patient's average daily alcohol consumption

Appendix 3 – CAGE Questionnaire

5.2 Resources and Forms

- CALHN OWI 03862 Alcohol Withdrawal - Pathway for Patients Presenting to the Emergency Department
- CALHN Guidelines for the Medical Management of Patients at Risk of Alcohol Withdrawal (2015) (not yet an OWI)
- MR 36.2 Alcohol Withdrawal Assessment and Observation
- CALHN CIS 03864 Referral to DASSA Withdrawal Services
- Inpatient withdrawal services (link to DASSA brochure)
- Reduce your risk – New National Guidelines for Alcohol Consumption (patient information sheet from the Australian Government Department of Health and Ageing)
- Alcohol and Young People (Wallet Card from DASSA)

6. REFERENCES

CALHN Guidelines for the Medical Management of Patients at Risk of Alcohol Withdrawal (2015)

7. HEALTH AND SAFETY

7.1 Work Health and Safety

The responsible manager must ensure the worker who undertakes this instruction receives adequate information, induction, training, direction / supervision and support to fulfil their responsibilities in line with requirements documented in this procedure.

Workers following this procedure have a duty of care for taking reasonable steps to protect their own health and safety and not adversely affecting another person while at work.

Below is the hyperlink to the SA Heath WHS&IM home page:

SA Health Workforce Health Home Page

The following hyperlink takes you to Inside Central WH&S Home Page

7.2 Infection Control Commonly Used Procedures Are Listed Hereunder

Standard Precautions
Transmission-based Precautions
Blood and Body Substance Spills
Principles of Assessment and Management
Hand Hygiene
Disposing of Sharps Instruments

8. KEY WORDS

National Standard 2, National Standard 5, National Standard 6, alcohol, drug and alcohol, pathway, intoxication, intoxicated, withdrawal, aws, ED, nRAH,

9. CONSULTATION CHECK BOX (Document cannot proceed without this compulsory list).

ESSENTIAL STAKEHOLDERS (Must be sent to the areas below for consultation. Evidence will need to be provided otherwise it will be returned.)	**NAME & POSITION** (It MUST be noted below that the Essential Consultation has occurred by stating the name and position of who has consulted on this document)
WORK, HEALTH & SAFETY Compliant as per Section 7 of the procedure	N/A
INFECTION PREVENTION & CONTROL UNIT	N/A
CALHN ANTIMICROBIAL STEWARDSHIP COMMITTEE (MANDATORY for ALL antibiotic medication related procedures)	Approval by Chair of CALHN Antimicrobial Stewardship Committee ☐ Yes
CALHN DRUG & THERAPEUTICS COMMITTEE (MANDATORY for ALL medication related procedures)	Approval by Chair of CALHN Drug & Therapeutics Committee ☐ Yes
WORKFORCE – (Human Resources) (Only required for non-clinical procedures)	N/A
*Any other Stakeholder who may be affected by this document.	(Minutes of Committees / union consultation to be provided)
Dr Megan Brooks	Emergency Physician, Emergency Department, Royal Adelaide Hospital
Dr Julie Bunney	Emergency Physician, Emergency Department, Royal Adelaide Hospital
Dr Alan Broomhead	Emergency Physician, Emergency Department, The Queen Elizabeth Hospital
Mr Chris McCaskill	Clinical Services Coordinator, Emergency Department, The Queen Elizabeth Hospital
Dr Chris Holmwood	Addiction Medicine Specialist, Director, Clinical Consultation Liaison and Standards, Drug and Alcohol Services South Australia
Ms Carol Kennedy	Clinical Practice Consultant, Drug and Alcohol Clinical Liaison Service, Royal Adelaide Hospital
Was this document approved by a Committee? (Other than the CALHN Drug & Therapeutics and/or CALHN Antimicrobial Stewardship Committees)?	No : Name of Committee (Minutes Are To Be Provided)
Was Legal advice required? NB Legal advice is rarely required and must be sought through risk management.	No

10. VERSION TRACKING

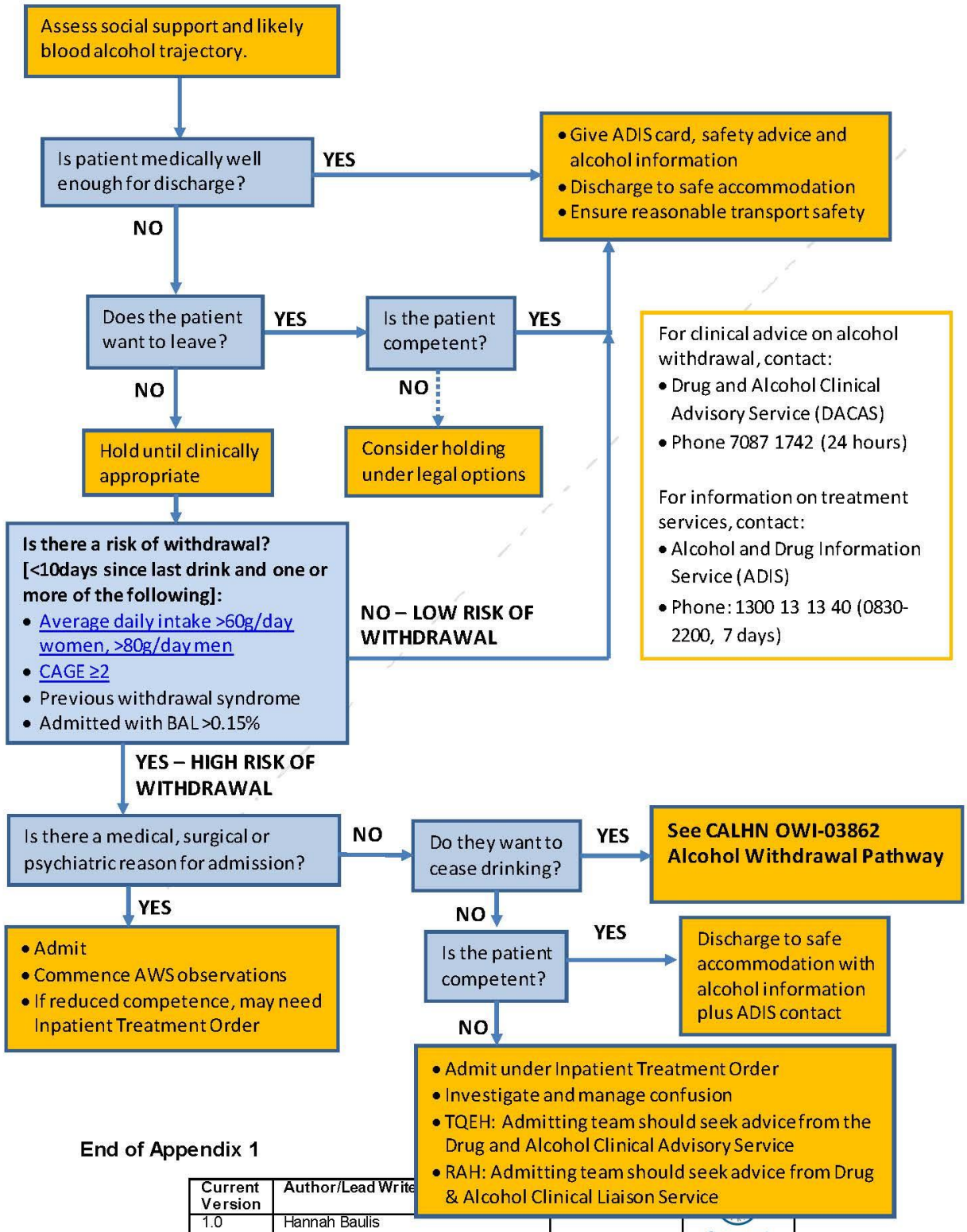
Revision of this document subsequent to date of printing or downloading may render hard copy text obsolete. Check Version Number on the eCentral System.			
Version	**Effective From**	**Change Summary**	**Effective To**
1.0	August 2015	New document	November 2016

11. AUTHORISATION

Author/Lead Writer:	**Authorisation:**
Hannah Baulis Associate Clinical Services Coordinator Emergency Department Royal Adelaide Hospital Hannah.baulis@health.sa.gov.au	Dr Tina Jones Co-Director Critical Care Services CALHN

END OF INSTRUCTION

Appendix 1: Alcohol Intoxication Pathway



End of Appendix 1

Appendix 2

Estimating the patient's average daily alcohol consumption

C) AVERAGE DAILY ALCOHOL CONSUMPTION CHART: STANDARD DRINKS Estimate the patient's alcohol consumption

Each of these contain 'one standard drink'. 'One standard drink' is equal to 10 grams alcohol.

Types of alcohol	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	
Beer								
Table wine								
Spirits								
Fortified wine								**Weekly total** (grams)
Daily total (grams)								

Average daily alcohol consumption during the past week ☐ **grams** *(Weekly total divided by seven eg 14 / 7= 2)*

Adapted from: Dawe, S., Loxton, N.J., Hides, L., Kavanagh, D.J. & Mattick, R.P. 2002, *Review of diagnostic screening instruments for alcohol and other drug use and other psychiatric disorders*, Monograph series no 49, 2nd edn, Commonwealth Department of Health and Ageing

End of Appendix 2.

Appendix 3

CAGE Questionnaire

Score 1 for each 'yes' answer

1. Have you ever felt you needed to **C**ut down on your drinking?
2. Have people **A**nnoyed you by criticising your drinking?
3. Have you ever felt **G**uilty about drinking?
4. Have you ever felt you needed a drink first thing in the morning (**E**ye-opener) to steady your nerves or to get rid of a hangover?

End of Appendix 3.

Appendix 2 Ethical Approval from Local Health Network

Government of South Australia
SA Health

Central Adelaide Local Health Network
Royal Adelaide Hospital Human Research Ethics Committee
Level 3, Roma Mitchell House
North Terrace, Adelaide SA
Australia 5000

Ground Floor, Basil Hetzel Institute for Translational Research
28 Woodville Road, Woodville SA
Australia 5000

T : 08 7117 2229
T : 08 8222 6841
E : Health.CALHNResearchEthics@sa.gov.au

Approval Date: 26 December 2017

HREC Reference number: HREC/18/CALHN/6

CALHN Reference number: R20171207

Ms Kelly Mooney
School of Nursing
The University of Adelaide

Dear Ms Mooney,

Project Title: How does a recorded breath alcohol level influence the clinical management of an intoxicated patient and their length of stay in the Emergency Department?

Thank you for submitting the above project for ethical review. This project was considered by the Chairman of the Royal Adelaide Hospital Research Ethics Committee. I am pleased to advise that your protocol has been granted full ethics approval and meets the requirements of the *National Statement on Ethical Conduct in Human Research* (2007) incorporating all updates. The documents reviewed and approved include:

Document	*Version*	*Date*
LNR Ethics and Governance Application Form	-	24 December 2017
Protocol	1	5 December 2017
Data Collection Sheet	1	5 December 2017
Cover Letter	-	5 December 2017

Sites covered by this approval:

- Royal Adelaide Hospital, SA : Ms Mooney

HREC approval is valid from **26 December 2017 to 26 December 2022**

GENERAL TERMS AND CONDITIONS OF ETHICAL APPROVAL:

1. This HREC is the South Australian 'lead HREC' for the purpose of this ethics approval. Any study sites that are not listed on this letter are not covered by this ethics approval. For any SA study-sites within the public health system that are proposed to be added, the CPI must write formally to this HREC requesting the additional study site and a separate formal letter will be issued.
2. Adequate record-keeping must be maintained in accordance with GCP, NHMRC and state and national guidelines. The duration of record retention for all clinical research data is 15 years from the date of publication.
3. Researchers are required to immediately report to this REC anything which might warrant review of ethical approval of the study, including:
   (a) adverse events which warrant protocol change or notification to research participants;
   (b) changes to the protocol;
   (c) changes to the safety or efficacy of the investigational product, device or method;
   (d) premature termination of the study.
4. The Committee must be notified within 72 hours of any Urgent Safety Measures (USMs) occurring at this or any approved sites.
5. Confidentiality of the research participants shall be maintained at all times as required by law.
6. Approval is valid for **5 years** from the date of this letter, after which an extension must be applied for.
7. Investigators are responsible for providing an annual review to the CALHN HREC Executive Officer each anniversary of the above approval date, within 10 workings days, using the Annual Review Form available at: https://www.rahresearchfund.com.au/rah-research-institute/for-researchers/human-research-ethics/
8. The REC must be advised with a report or in writing within 30 days of completion.

Should you have any queries about the HREC's consideration of your project, please contact Ms Heather O'Dea on 08 8222 4139, or Health.CALHNResearchEthics@sa.gov.au.

You are reminded that this letter constitutes ethical approval only. You must not commence this research project at

a SA Health site until governance authorisation at that site has been obtained. Please contact the CALHN Research Office Health.CALHNResearchLNR@sa.gov.au

This Committee is constituted in accordance with the NHMRC's *National Statement on the Ethical Conduct of Human Research* (2007).

The HREC wishes you every success in your research.

Yours sincerely

A/Prof A Thornton
CHAIRMAN
RESEARCH ETHICS COMMITTEE

Appendix 3 Ethical Approval from Human Research Ethic Committee from University of Adelaide

ResearchMaster

Human Ethics Application

Application ID :	32689
Application Title :	QUESTION: How does a recorded Breath Alcohol Level influence the clinical management of an intoxicated patient and their length of stay in the Emergency Department?
Date of Submission :	12/01/2018
Primary Investigator :	Everett, Iain; Associate Investigator
Other Personnel :	Marshall, Amy; Associate Investigator
	Kastelein, Christopher; Associate Investigator
	Mooney, Kelly Jane; Creator
	Mooney, Kelly Jane; Chief Investigator

Introduction

Introduction

This form enables University of Adelaide staff and students to notify the University of ethics approvals received from external Human Research Ethics Committees.

It is a precondition of the University's insurance cover that all human research projects are notified to the University. The notification process ensures staff, students and participants in studies are covered by the appropriate ethics approvals and indemnified by the University's insurance policies.

Notifications are required to be submitted within **fourteen days** of receiving ethical approval.

Notifications are reviewed by the University of Adelaide's Human Research Ethics Secretariat who will advise if approval from the University of Adelaide Human Research Ethics Committee is also required. Notifications are also assessed by the University's Insurance Office and the relevant certificates of insurance will be issued.

General

Project Investigators

Chief Investigator:
Only one Chief Investigator should be added. This can be an external person. Add details of the Chief Investigator by searching for 'Last Name, First Name' or 'Last Name' only or by 'User ID'. Only use 'Add External Person' if you need to add a NEW external person who cannot be located using the search function.*

1	Investigator Position	Chief Investigator
	User ID	1174843
	Investigator Details Title	Miss
	First Name	Kelly
	Last Name	Mooney
	Full name (use format ***Last Name, First Name***)	Mooney, Kelly Jane
	In what capacity is this person involved in the project?	Student (University of Adelaide)
	What level of student is this person?	Masters by Research
	Staff ID	
	Student ID	
	Does the University of Adelaide staff or student ID for this person require updating (i.e. is missing or incorrect)?	No
	Department / Discipline	Nursing
	School	Adelaide Nursing School
	Organisation	90007 - The University of Adelaide
	Role in this project Is this person the primary University of Adelaide contact?	No
	Is this person the Chief Investigator?	Yes
	Indicate this person's involvement in the project	Data collection, Research design (including design of data collection tools or methodology), Statistical sampling or analysis
	Private Indemnity Insurance If your role within the study requires you to maintain a professional registration (such as Medical and Allied Health Professionals and	No

	Veterinarians), then you will need to hold your own Private Indemnity Insurance. If you are conducting surveys or your role within the study does not require you to maintain a professional registration, then you do not need to hold Private Indemnity Insurance. Does this person's role within the project require them to hold their own Private Indemnity Insurance (Professional Indemnity, Medical Malpractice etc.)?	
	Contact Details Work Number	
	Update to work number	
	Email Address	
	Do any of the details for this person require updating or are missing?	No

Other Investigator(s):
Add details of the other investigator(s) listed on the ethics approvals by searching for 'Last Name, First Name' or 'Last Name' only or by 'User ID'. Only use 'Add External Person' if you need to add a NEW external person who cannot be located using the search function.

1	User ID	
	Investigator Details Title	Mr
	First Name	Iain
	Last Name	Everett
	Full name (use format ***Last Name, First Name***)	Everett, Iain
	In what capacity is this person involved in the project?	Staff (University of Adelaide)
	Staff ID	
	Student ID	
	Does the University of Adelaide staff or student ID for this person require updating (i.e. is missing or incorrect)?	No
	Department / Discipline	Nursing
	School	Adelaide Nursing School
	Organisation	90007 - The University of Adelaide
	Role in this project Investigator Position	Associate Investigator
	Is this person the primary University of Adelaide contact?	Yes
	Indicate this person's involvement in the project	Supervisor
	Private Indemnity Insurance If your role within the study requires you to maintain a professional registration (such as Medical and Allied Health Professionals and Veterinarians), then you will need to hold your own Private Indemnity Insurance. If you are conducting surveys or your role within the study does not require you to maintain a professional registration, then you do not need to hold Private Indemnity Insurance.	No

	Does this person's role within the project require them to hold their own Private Indemnity Insurance (Professional Indemnity, Medical Malpractice etc.)?	
	Contact Details Work Number	
	Email Address	
	Do any of the details for this person require updating or are missing?	No
2	User ID	
	Investigator Details Title	Ms
	First Name	Amy
	Last Name	Marshall
	Full name (use format ***Last Name, First Name***)	Marshall, Amy
	In what capacity is this person involved in the project?	Staff (University of Adelaide)
	Staff ID	
	Student ID	
	Does the University of Adelaide staff or student ID for this person require updating (i.e. is missing or incorrect)?	No
	Department / Discipline	Nursing
	School	Adelaide Nursing School
	Organisation	90007 - The University of Adelaide
	Role in this project Investigator Position	Associate Investigator
	Is this person the primary University of Adelaide contact?	No
	Indicate this person's involvement in the project	Supervisor
	Private Indemnity Insurance If your role within the study requires you to maintain a professional registration (such as Medical and Allied Health Professionals and Veterinarians), then you will need to hold your own Private Indemnity Insurance. If you are conducting surveys or your role within the study does not require you to maintain a professional registration, then you do not need to hold Private Indemnity Insurance. Does this person's role within the project require them to hold their own Private Indemnity Insurance (Professional Indemnity, Medical Malpractice etc.)?	No
	Contact Details Work Number	
	Update to work number	

	Email Address	
	Do any of the details for this person require updating or are missing?	No
3	User ID	
	Investigator Details Title	Mr
	First Name	Christopher
	Last Name	Kastelein
	Full name (use format ***Last Name, First Name***)	Kastelein, Christopher
	In what capacity is this person involved in the project?	Staff (University of Adelaide)
	Staff ID	
	Student ID	
	Does the University of Adelaide staff or student ID for this person require updating (i.e. is missing or incorrect)?	No
	Department / Discipline	Health and Medical Sciences Simulation and Clinical Skills
	School	Health and Medical Sciences Faculty Office
	Organisation	90007 - The University of Adelaide
	Role in this project Investigator Position	Associate Investigator
	Is this person the primary University of Adelaide contact?	No
	Indicate this person's involvement in the project	Supervisor
	Private Indemnity Insurance If your role within the study requires you to maintain a professional registration (such as Medical and Allied Health Professionals and Veterinarians), then you will need to hold your own Private Indemnity Insurance. If you are conducting surveys or your role within the study does not require you to maintain a professional registration, then you do not need to hold Private Indemnity Insurance. Does this person's role within the project require them to hold their own Private Indemnity Insurance (Professional Indemnity, Medical Malpractice etc.)?	No
	Contact Details Work Number	
	Update to work number	
	Email Address	
	Do any of the details for this person require updating or are missing?	No

HRE Notification created by:

1	User ID	

	Position	Creator
	Full Name	Mooney, Kelly Jane
	Department/Discipline	Nursing
	Managing Unit	Adelaide Nursing School

Approval Details

For the named project provide details of ethics approvals granted by institutional Human Research Ethics Committees other than the University of Adelaide's. If approval has been received from more than one committee, one needs to be entered as the 'Primary Human Research Ethics Committee Approval'. Details of any additional approvals relevant to the project are to be entered under 'Other Human Research Ethics Committee approvals'.

Ethics Category:*

Human Ethics

Project Title: *

QUESTION: How does a recorded Breath Alcohol Level influence the clinical management of an intoxicated patient and their length of stay in the Emergency Department?

What level(s) of review has this project been subject to: *

- [x] Full review (greater than low risk research)
- [ ] Low risk review
- [ ] Negligible risk review
- [ ] Exempt from review process

How many different Human Research Ethics Committees have approved this project?*

1.00

Primary Human Research Ethics Committee Approval:

Provide details of the ethics approval received from the primary or lead Human Research Ethics Committee for this project:

Primary Committee Name:*

Central Adelaide Local Health Network Human Research Ethics Committee (CALHN HREC)

Date Project Approved by Committee:*

26/12/2017

Approval Number:*

R20171207

Approval Start Date:*

26/12/2017

Approval End Date:*

26/12/2022

PDF Copy of Approval Certificate or Approval Letter (only PDF format is accepted):*

R20171207 Approval Letter-signed.pdf

Ethics approval from the University of Adelaide Human Research Ethics Committee:
In the majority of cases when a project has ethics approval from another Human Research Ethics Committee, additional ethics approval from the University of Adelaide is not required. However, in some situations projects may require further ethics approval from the University of Adelaide. This may include where another institution's Human Research Ethics Committee(s) or governance office requires the project to obtain further ethics approval from the University of Adelaide or, in some cases, where there is work or there are sites involving University of Adelaide researchers not covered by the ethics approval(s) detailed in the notification.

Does the project require further ethics approval from the University of Adelaide Human Research Ethics Committee?*

○ Yes ◉ No ○ Unsure

Project Overview

Outline the research project's aims, methodology and the planned interactions with participants.

Project Aim:
Provide a plain language summary of the aims and potential outcomes of the project.*

to examine the relationship between breath alcohol levels and treatment for patients presenting to the emergency department for acute alcohol intoxication

Research Methods:
Select all the appropriate research method(s) that will be used in this project. Consult the definitions of research methods for guidance on selecting the method(s) applicable to the project. *

- ☐ Action research
- ☐ Biospecimen analysis
- ☐ Textual analysis
- ☐ Clinical Trials
- ☑ Data linkage
- ☐ Epidemiological
- ☐ Ethnographic
- ☐ Interventional
- ☐ Observational
- ☐ Other
- ☐ Survey / Interview / Focus Group

If 'clinical trials' has been selected above, outline which clinical trial registry(ies) the trial is registered on:

This question is not answered.

If 'other' has been selected above, briefly summarise the other type(s) of research methods that will be employed:

This question is not answered.

Project Description:
Describe the project methodology and the interactions that will occur between researchers and participants.*

data will be collected from electronic patient records and medical records from previous attendances to the Emergency Department by the chief investigator. data to be collected includes Date and time of presentation, Unit reference number (URN), Age, Gender, Postcode, Australasian Triage Scale score, Discharge time, Discharge disposition from the Emergency Department, Breath alcohol levels recorded and Treatment provided including but not restricted to intravenous fluids, intravenous medications. the data will then have all identifiable data removed prior to analysis and examination by other investigators

Participants & Potential Risk

Participant Numbers:
The University of Adelaide is required to report to the insurers the number of participants in projects.

What is the total number of participants in the project?*

300.00

What is the number of participants for the University of Adelaide investigator's involvement in the project?*

300.00

Participant Details:

Does the research specifically target participants from any of the following groups?*

- [x] -- None of the below specifically --
- [ ] Aboriginal and Torres Strait Islander People
- [ ] University students
- [ ] Women who are pregnant and the human fetus
- [ ] Children and young people
- [ ] Defence Force personnel
- [ ] People highly dependent on medical care who may be unable to give consent
- [ ] People in dependent or unequal relationships
- [ ] People in other countries
- [ ] People who may be involved in illegal activities
- [ ] People with a cognitive impairment, an intellectual disability or a mental illness
- [ ] Primary or secondary school students

Potential Risks to Participants:

Describe any potential risks to participants that may occur from their involvement in the project: *

nil

Potential Risks to Researchers:

Describe any possible risks to the health or safety of the researcher(s) when undertaking the research: *

nil

Project Location & Funding

Source of Participants and Project Location:

Is the research to be solely conducted online?*

○ Yes ◉ No

Indicate the overarching locations of the research, including the site(s) for fieldwork and location(s) of participants:*

- [x] South Australia
- [ ] Interstate
- [ ] Overseas

Select all the South Australian locations where the research will take place:*

- [ ] Adelaide
- [ ] Adelaide Dental Hospital
- [ ] The Queen Elizabeth Hospital
- [ ] The University of Adelaide
- [ ] University of South Australia
- [ ] Women's and Children's Hospital
- [ ] Flinders Medical Centre
- [ ] Flinders University
- [ ] Lyell McEwin Hospital
- [ ] Modbury Hospital
- [ ] Private hospital(s)
- [ ] Private practice(s)
- [ ] Regional SA

Royal Adelaide Hospital

☑

Provide details of the **South Australian** research location(s) including cities, regions, organisations, services, schools and/or laboratories where the research will take place or locations from where participants will be recruited. *

Royal Adelaide Hospital.

Project Funding:

Select the funding for this project:*

- ☐ Competitive research grant
- ☐ Other funding
- ☑ Unfunded

Indemnification Details

Are there any third parties involved in this project other than The University of Adelaide?*

○ Yes ◉ No

Does The University of Adelaide have overall responsibility for indemnifying all parties involved in the project?*

◉ Yes ○ No

Do you require a 'Clinical Trials and Human Studies' insurance certificate?*

○ Yes ◉ No

Declaration

Any other ethical or relevant issues not yet discussed in this notification:

This question is not answered.

Attachments: Add other attachments as required or if requested

This question is not answered.

Human Research Ethics Approval Notification Declaration

I/we accept responsibility for the conduct of this research project in accordance with the National Statement on Ethical Conduct in Human Research (2007), the Australian Code for the Responsible Conduct of Research and the University's Responsible Conduct of Research Policy.

I/we agree to notify the University of Adelaide's Human Research Ethics Committee in writing in the event of any adverse or unforeseen events, amendments to the approved protocol that may alter whether this notification can be accepted by the University, changes to the approval end date, at project completion and of any changes to research personnel.

Primary University of Adelaide Contact Signoff:*

1	ID	
	Type	Internal
	Full Name	Everett, Iain
	Position	Associate Investigator
	Declaration signed?	Yes
	Signoff Date	12/01/2018

Outcome

Review Outcome

This page provides the outcome of the reviews by the Human Research Ethics Secretariat and Insurance Office.

Outcome of Review of Notification Form:

Accepted: The University of Adelaide has accepted this notification of Human Research Ethics Committee approval(s).
The University of Adelaide's involvement will be indemnified by The University of Adelaide's insurance(s).

Project Title:

QUESTION: How does a recorded Breath Alcohol Level influence the clinical management of an intoxicated patient and their length of stay in the Emergency Department?

University of Adelaide Notification Reference Number:

32689

Date notification processed:

16/01/2018

End date of the primary Human Research Ethics Committee's approval:

26/12/2022

Notification of Human Research Ethics Approval Conditions:

Researchers are required to conduct this project in accordance with the ethics approval(s) received. They are also required to comply with the National Statement on Ethical Conduct in Human Research (2007), the Australian Code for the Responsible Conduct of Research, the University of Adelaide's Responsible Conduct of Research Policy. University of Adelaide researchers must notify the HREC Secretariat by email of any adverse events or changes to their project in accordance with the University of Adelaide's reporting requirements for notifications.

Project Specific Conditions of Acceptance:

This question is not answered.

Insurance Details:

The University of Adelaide's involvement will be indemnified by the University of Adelaide's insurance(s).

Insurance Comment(s) from Legal and Risk:

Trial to be afforded cover under the Clinical Trials and Human Studies Insurance held by the University of Adelaide.

Provision of Insurance Certificates:

- ☐ Public Liability Certificate of Insurance
- ☐ Professional Indemnity Certificate of Insurance
- ☐ Clinical Trial(s) Certificate of Insurance
- ☐ Medical Malpractice Certificate of Insurance

This question is not answered.

The Primary University of Adelaide contact will receive relevant Certificate(s) of Insurance by email. Insurance policies held by The University of Adelaide are renewed on a calendar year basis and at the beginning of each year the Primary University of Adelaide contact will be issued the renewed Certificate(s) of Insurance.

Duty of Disclosure:

In order to receive the benefit of insurance, the University must fulfil a "duty of disclosure" to its insurer. This duty requires the University to notify the insurer of every known fact, circumstance or event (i.e. 'notifiable event') as and when it happens, so that at all times the information relied on by the insurer is correct and complete. Failure to immediately report a notifiable event to the insurer places the University at risk of not being covered by insurance. A notifiable event may be a consequence, fact, event, situation, omission, occurrence, activity or failure to do something that could result in a claim made against the University. It may be words in an email, something said to you or a misrepresentation in a brochure. These 'things' may require a formal or an informal resolution and they may end up in court. For further information about Notifiable Event reporting, please click on the

following link:
http://www.adelaide.edu.au/legalandrisk/insurance/notifiableevents/

Appendix 4 Data Collection Form

	A	B	C	D	E
1	PARTICIPANT URN	GENDER (F/M)	AGE	POSTCODE	PRESENTATION DATE
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	F	G	H	I
1	PRESENTATION TIME	TRIAGE SCORE (ATS)	INITIAL BAL TIME	INITIAL BAL SCORE
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	J	K	L	M
1	CONSEQUETIAL BAL TIME	CONSEQUENTIAL BAL SCORE	IVT (Y/N)	IVT (How Much)
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	N	O	P	Q
1	IV Thiamine (Y/N)	IV Ondansetron(Y/N)	Other Treatment	Discharge Time
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	R	S
1	**Discharge Destination**	**Total Time in ED**
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