Evaluation of NSW Health Drug and Alcohol Consultation Liaison Services

Final Report
November 2014

Report for the Mental Health Drug and Alcohol Office (MHDAO), NSW Health

Centre for Health Economics Research and Evaluation (CHERE), University of Technology, Sydney

National Drug and Alcohol Research Centre (NDARC), University of NSW

CHERE Authors

Reeve, R., Arora, S. Viney, R., Goodall, S., van Gool, K., Knox, S., Kenny, P.

NDARC Authors

Butler, K., Burns, L., Conroy, E.

Acknowledgements

The authors of this report would like to acknowledge and thank all those who participated in, and assisted with this evaluation. We thank the sites and patients for their participation and the data custodians for providing data for consenting participants. We are also grateful to the NDARC interviewers for conducting the surveys. Thank you to Liz Chinchen and Marion Haas for proof reading the draft final report.

This research was commissioned by MHDAO, NSW Ministry of Health. The opinions, comments and analysis contained in this document are those of the authors.

Table of Contents

List of Tables

List of figures

Glossary of Terms

ABS	Australian Bureau of Statistics
AOD	Alcohol or Other Drugs
APDC	Admitted Patient Data Collection (formerly Inpatient Statistics Collection)
ARIMA	Auto Regressive Moving Average (regression analysis method)
ASSIST	Alcohol, Smoking and Substance Involvement Screening Test
ATC	Anatomical Therapeutic Chemical
CHERE	Centre for Health Economics Research and Evaluation
CHeReL	Centre for Health Record Linkage
CL	Consultation Liaison
D&A	Drugs and/or Alcohol
ECL	Enhanced funded Consultation Liaison
ED	Emergency Department
EDIS	Emergency Department Information Systems
ICD	International Classification of Diseases
ICU	Intensive Care Unit
IIMS	Incident Information Management System
LOS	Length of Stay
MLK	Master Linkage Key
NDARC	National Drug and Alcohol Research Centre
OLS	Ordinary Least Squares (regression analysis method)
PECC	Psychiatric Emergency Care Centre
PSH	Property, Security, Hazard (IIMS database)
SEIFA	Socio Economic Index for Areas (ABS index of socio-economic wellbeing)
SNOMED-CT	Systematized Nomenclature of Medicine - Clinical Terms
SVC	Staff, Visitor, Contractor (IIMS database)
WHODAS	World Health Organisation Disability Assessment Schedule

Executive Summary

Key messages from the evaluation

- Drugs and alcohol have a significant impact on our hospital system
- More than one-third (35%) of people presenting to NSW hospitals have a drug and alcohol (D&A) problem in need of some level of intervention
- Presentations for people with D&A alcohol problems occur 7 days a week and are more frequent in the afternoon and evening than other times of day
- D&A problems are often not identified during the presentation; 90% of people in need some level of intervention, and 76% of those requiring intensive intervention, are not referred to hospital D&A Consultation Liaison (CL) services
- There is unmet-need for D&A CL services, as only one-quarter (24%) of people requiring intensive intervention are currently referred to and treated by CL services
- Hospital D&A CL services, which are specialist D&A services operating in hospital settings, are a low cost intervention which produce cost savings to hospitals, through a reduction in future presentations
- The difference between the cost of providing D&A CL and the savings from reduced ED presentations for those receiving a D&A CL intervention amounts to a net benefit of at least $203 per new D&A CL patient per annum
- Based on the current patient numbers being treated by D&A CL services, this amounts to an average net benefit of over $100,000 per hospital per year
- D&A CL services:
    - prevent an increase in average length of stay in ED over time
    - prevent a worsening in emergency admission performance
    - reduce the frequency of ED presentations over time
    - decrease the rate of admissions over time
    - increase the uptake of PBS drugs related to D&A, with no overall increase in PBS costs
- The majority of services that received dedicated funding to enhance their D&A CL service experienced a reduction in incidents

Background and Aims

Hospital Drug and Alcohol Consultation Liaison (D&A CL) services are specialist D&A services operating in hospital settings providing consultation (advice regarding the management of D&A related issues for referred patients), and liaison (enhancing capacity of generalist health providers to address D&A issues in their routine clinical work). An important characteristic of hospital D&A CL services is that they provide services to patients under the care of another treatment team during the period in hospital, rather than to patients under the primary care of a D&A specialist service.

The aim of D&A CL is to enhance identification of patients with drug and alcohol morbidity and provide direct access to specialist services for support, treatment advice and assistance with the management of the condition. D&A CL services may alleviate emergency department (ED) and inpatient ward access and exit blockages, reduce re-admissions due to re-injury and improve long term health outcomes. Most NSW hospitals have some form of D&A CL services, but in many hospitals these are limited. NSW Health provided funding for a four year trial to enhance D&A CL services in some NSW hospitals.

The aim of this evaluation was to evaluate the costs and consequences of D&A CL services and to investigate any changes associated with the provision of enhanced funding. The evaluation was conducted by the Centre for Health Economics Research and Evaluation and the National Drug and Alcohol Research Centre.

Methods

The evaluation is comprised of two related studies, Study 1 (baseline and follow-up patient surveys) and Study 2 (economic evaluation).

- For Study 1, patients were recruited from Emergency department and selected wards at eight NSW public hospitals. Baseline surveys were administered in each hospital over a 10 day period, where all waiting patients were approached and screened for eligibility. In the follow-up survey those who had screened positive for having substance use problems, and who consented to be followed up, were invited to participate in a telephone survey to measures changes in substance use during the time since baseline survey, general functioning, and health service utilisation.
- In Study 2, firstly time series analysis of aggregate administrative data was conducted, to investigate differences between hospitals and, where possible, assess any impact of enhanced D&A CL funding. Next, to estimate the burden of D&A and the impact of D&A CL services on individual patient outcomes, Study 2 utilised the medical records of consenting patients from Study 1. Analysis was undertaken of the patterns of service, health system resource use and costs over time. Comparisons were made between patients with and without D&A problems, and, among those patients with D&A problems, between those who received and did not receive D&A CL services. The final component of Study 2 was a cost-consequences analysis based on estimation of the costs and outputs of provision of CL services and the estimated cost-offsets resulting from different patterns of health system resource use from provision of CL services.

Key Findings

Impact of drugs and alcohol on the hospital system

Drugs and alcohol have a significant impact on our hospital system. D&A problems are common among patients presenting to NSW public hospitals. Of the total 1,615 individuals surveyed, 35% screened positive for problematic substance use. Given that intoxication was an exclusion criterion (i.e. people who were highly intoxicated could not provide informed consent and hence were not included) this is likely a conservative estimate of the prevalence of substance use problems. Poly-substance use was common; 12% of the sample screened positive for problematic substance use for two or more substances. According to the Alcohol, Smoking and Substance Involvement Screening Test (ASSIST) measure, almost one third (32%) of the total sample screened positive for problematic substance use requiring a brief intervention and 7% screened positive for problematic substance use requiring more intensive treatment. People with D&A problems present 7 days a week and are more likely to present in the afternoon and evening than at other times of day.

Despite the high prevalence of D&A problems among people presenting to hospital, among the D&A group, service utilisation for substance use was low; 75% of the group had never accessed any type of substance use treatment service. Of those who had used a service previously, it was largely for counselling (19%), detoxification (13%) and support groups (12%).

The analysis of health services utilisation of patients in the survey found that patients with D&A problems have higher health services utilisation and costs over time. Those identified as requiring an intensive intervention for substance use presented twice as often as people who screened negative for D&A problems with an associated additional ED cost of $177 per person per quarter than those without D&A problems. People who identified as needing an intensive intervention were more likely to be admitted to a psychiatric ward during their stay. Furthermore, once admitted into a psychiatric ward they had a longer length of stay in the ward. People who were identified as requiring an intensive intervention had a longer total length of stay per admission compared to those who screened negative.

Identification of patients with D&A problems and referral to D&A CL services

Our results suggest that D&A problems are often not identified during the patient's presentation. Despite the findings that more than one third of waiting patients self-reported a substance use problem, the hospital level ED data analysis found only a small proportion of patients receive a drug

and alcohol diagnosis (less than 1% on average) as their primary diagnosis, the majority of which are for "mental and behavioural problems related to alcohol use". The small proportion of D&A diagnoses is not unexpected as D&A may not be the main reason for presenting, even if it is a contributing factor. Nevertheless it demonstrates the need for an alternative method of identification of patients with D&A problems, especially at intake.

In the follow-up survey of patients with D&A problems, only 8% of respondents reported having been referred to substance us services by hospital staff. The patient data analysis revealed that a relatively small proportion of patients who might be eligible for D&A CL services received them. Ten percent of people in Study 2 who screened positive in the survey for D&A problems received a D&A CL intervention during the evaluation period. The majority of those referred to CL were identified in the survey as requiring an intensive intervention, suggesting that CL services are capturing D&A patients with the highest level of need. However, those treated by CL were only approximately a quarter of patients found to require an intensive intervention, suggesting that there is scope for improving the implementation or expanding the delivery of D&A CL services.

Costs and consequences of provision of CL services

D&A CL services are a low cost-intervention resulting in improved outcomes over time and a net-benefit to hospitals. Overall, the average cost of delivering CL services per new client is estimated at $657. This compares to an estimated reduction in ED costs for patients who received CL relative to the comparison group (those requiring an intensive intervention, but who did not receive CL) of $860 in the first year following the intervention. Based on this estimate, compared to the cost of the intervention, CL is expected to result in net savings of $203 per new CL client in the first year ($860-$657). If we multiply this net benefit per new client by the average number of new clients at each site, this amounts to an estimated net benefit of $103,936 per annum per site. There are other positive benefits of CL not expressed in dollars. Based on our regression results D&A CL services:

- prevent an increase in average LOS in ED over time
- prevent a worsening in emergency admission performance (observed for the ASSIST intensive need group but not for the CL group in the post intervention period)
- impact on frequency of presentations, which eventually decrease for people who received CL relative to the comparison group
- decrease the rate of admissions over time

- increase the uptake of selected PBS drugs and associated costs but with no overall increase in PBS costs

Evidence from the analysis of aggregate hospital data, which focussed on hospital outcomes over time before and after enhanced funding was introduced, also suggested benefits at some hospitals from enhanced funding**. It is important to note that most hospitals had some degree of CL service prior to receiving enhanced funding and therefore these outcomes are conservative** as, rather than reflecting the full impact of D&A CL, they demonstrate the possible impact of additional funding and therefore depend on how this funding changed the service.

The introduction of enhanced funding is associated with:

- decreased rate of D&A admissions at 5 (out of 12) hospitals
- reduced rate of incidents at 9 (out of 12) hospitals

Overall, the economic evaluation provides evidence that the provision of D&A CL services in NSW hospitals has improved outcomes at modest costs and is likely to result in net savings to the health system. This finding is based on our most conservative estimates.

Section 1. Introduction

This report provides the final results of the evaluation of NSW Health Drug and Alcohol Consultation Liaison (D&A CL) Services. The evaluation was jointly undertaken by the National Drug and Alcohol Research Centre (NDARC), University of NSW and the Centre for Health Economics Research and Evaluation (CHERE), University of Technology Sydney.

The NSW Health, Mental Health Drug and Alcohol Office (MHDAO), provided funding for four years to trial enhanced D&A CL services in three Area Health Services (AHSs): Sydney South West Area Health Service (SSWAHS), the Children's Hospital Westmead (CHW) and Hunter New England Area Health Service (HNEAHS). In addition, Greater Western Area Health Service (GWAHS) and Greater Southern Area Health Service (GSAHS), had pre-existing recurrent funding for the provision of enhanced D&A CL services.

The original aim of the evaluation was to determine the impact of *enhanced funded* D&A CL Services in NSW hospitals. However, it was clear from an early stage of the evaluation that the extent and model of D&A CL services within hospitals was not solely determined by the provision of enhanced funding. Therefore, whilst the aggregate hospital analysis reported in Section 3 considers the impact of enhanced funding, the main focus of the report is on the impact of D&A CL, irrespective of the funding mechanism.

The overall evaluation comprises three studies: Study 1, patient surveys (baseline and follow-up); Study 2, economic evaluation; and Study 3, model of care (Appendix 2 to this report). This report presents the findings from Studies 1 and 2. Study 3, has been reported separately and is reproduced in Appendix 2 of this report.

Study 1 The baseline survey sampled patients presenting to the ED and admitted overnight to select hospital wards over a 10-day period between July 2011 and January 2012 at eight hospital sites: Royal Prince Hospital, St Vincent's Hospital, John Hunter Hospital, Wollongong Hospital, Lismore Base Hospital, Orange Base Hospital, Albury Base Hospital and Campbelltown Hospital. The survey was used to determine the proportion of presentations where drug and alcohol use was a contributing factor and the proportion of patients with a recent substance use problem. Those patients identified by the survey as having a drug and alcohol problem, regardless of whether they were referred to CL services, (the D&A group) were followed up three months later to determine recall of D&A CL services, uptake of referral to drug and alcohol treatment and changes in substance

use (the follow-up survey). Study 1 included seeking consent to access data to be used in Study 2.[1] This report presents the findings of the baseline survey data analysis and the follow-up survey.

Study 2 is the economic evaluation. Consent was sought during Study 1 to access the medical records, including Medicare data and NSW APDC, ED and Area Health Service D&A CL data of survey participants, from 18 months prior to the survey up to twelve months after the survey. These data are used in the economic evaluation to estimate the impact of receiving a D&A CL intervention on changes in the utilisation and associated costs of health services by patients over time. Study 2 also includes time series analysis of aggregate administrative data, to investigate differences between hospitals and, where possible, assess any impact of enhanced CL funding on hospital and emergency department indicators, such as length of stay, frequency of presentations and admissions and reported incidents. This report presents the key findings of the hospital and patient level analyses and the overall costs and consequences of D&A CL services in NSW hospitals.

Table 1.1 summarises information on commencement of enhanced funding of D&A CL services (ECL) and pre-existing D&A CL at each site used in the hospital level time series regression analyses in Study 2. Hospitals indicated with an asterisk are the sites that participated patient survey in Study 1 and are included in the patient level analyses in Study 2.

Table 1.1 Hospitals and CL/ECL status

Hospital	CL in 2005	ECL	Enhanced funded service commenced
Albury Base*	yes	yes	Approximately August 2007
Bathurst	no	yes	Operational July 2008
Campbelltown*	yes	yes	August 2008
Concord	yes	yes	August 2008
Dubbo	yes	yes	Approximately March 2010
Goulburn	no	yes	Approximately August 2007
John Hunter*	yes	yes	Recruitment June 2008, operational July 2008
Liverpool	yes	yes	August 2008, extended hours commenced October 2008
Orange*	no	yes	Recruited April 2007, operational August 2007.
Royal Prince Alfred*	yes	yes	August 2008, extended hours fully operational July 2009
Wagga Wagga	no	yes	Approximately August 2007
Westmead Children's Hospital	no	yes	June 2008

[1] The study has been approved by the following research ethics committees and has site specific agreements at each participating hospital:

- New South Wales Population and Health Services Research Ethics Committee (HREC/10/CIPHS/30)
- University of New South Wales Human Research Ethics Committee (HREC 11046)
- University of Technology (Sydney) Human Research Ethics Committee (HREC 2011-067R)

Lismore*	ad hoc	no	N/A
St. Vincent's*	Yes	no	N/A
Wollongong*	No	no	N/A

Source: Centre for Drug and Alcohol (April 2005) and personal communication with NSW Health

1.1.Background Information on Consultation Liaison Services in NSW

There is a high prevalence of drug and alcohol morbidity among patients presenting in emergency departments (EDs) (Conigrave et al., 1991; Indig et al., 2010), however it is frequently unidentified on admission (Shourie et al., 2007; Indig et al., 2008). Drug and alcohol morbidity is known to affect post-operative morbidity (Tonnesen et al., 2003), behavioural incidents, re-admission and re-injury rates (Rostenberg 1995).

Consultation Liaison (CL) services are a sub-specialty of psychiatry, and are practised extensively internationally (MHDAO Project Plan for Evaluation of Drug and Alcohol Consultation Services, July 2010). The principle behind CL is to enhance the identification of patients with drug and alcohol morbidity and provide direct access to specialist services for support, treatment advice and assistance with the management of the condition. Drug and Alcohol services were established in general hospitals in NSW in the 1980s when a number of senior nurses were appointed to liaise with nursing staff on all wards to ensure that they were made aware of drug and alcohol issues and to optimise the care of these patients. The first CL AOD services were established at St Vincent's and RPAH (Saunders J, 2009) and now operate in some form in most hospitals in NSW.

Evidence suggests that drug and alcohol CL services may alleviate ED and inpatient ward access and exit blockages, reduce re-admissions due to re-injury and improve long term health outcomes (MHDAO Project Plan for Evaluation of Drug and Alcohol Consultation Services, July 2010). This is achieved through: enhanced identification of patients that might experience a withdrawal syndrome; enhancing the skills of hospital staff, including medical and nursing staff in identifying patients with underlying alcohol and drug disorders; the provision of appropriate clinical care; management of substance use disorders and; referral to treatment services. Improving health outcomes, reducing re-admissions to EDs, and decreasing the length of stay in inpatient wards, are all intended outcomes of the initiative.

CL services may reduce the costs to the health system and improve health outcomes by enabling appropriate treatment, management and referral of patients with drug and alcohol related problems. Most NSW hospitals have some form of D&A CL services, but in many hospitals these are limited. From 2007 a number of hospitals have introduced enhanced D&A CL services, using dedicated funding with the aim of improving hospital performance indicators and health outcomes. A number of these hospitals had existing D&A CL services, funded from core drug and alcohol program funding. Table 1.1 summarises the information obtained by the Evaluation Team in relation

to the level of provision of CL Services, including enhanced CL, in the study hospitals. This information is relevant to the interpretation of the analysis presented in later sections of this report.

Specifically, the NSW Department of Health has funded enhanced CL services to:

- Improve ED performance indicators (i.e. reduce bed block) and improve hospital throughput.
- Increase the identification of patients with drug and alcohol problems.
- Improve the health outcomes and treatment pathways for patients with drug and alcohol problems.
- Improve generalist staff knowledge of CL services and their capacity to identify and refer patients with drug and alcohol problems.
- Provide a long term cost-effective strategy to reduce the impact of drug and alcohol presentations and hospital admissions on the NSW health system.

1.2. Evaluation objectives

The overall aim of this evaluation is to assess the impact on costs and consequences of D&A CL Services in NSW hospitals. The evaluation was commissioned in the context of enhanced funding to some D&A CL Services, but the focus was shifted to consider the impact of D&A CL services overall because the impact of enhanced funding depended on the existing level of CL services in the hospitals, with no standardised approach.

The specific objectives of the evaluation are to:

- Determine the patterns of drug and alcohol presentations to emergency departments and in admissions to selected inpatient wards in NSW hospitals.
- Estimate the patterns of utilisation and associated health system resource use and costs for patients presenting with D&A problems, compared with other patients.
- Quantify referral of patients with D&A problems to CL services
- Estimate the impact of referral to and uptake of CL services on patterns of health service utilisation and associated health system resource use and costs for patients with D&A problems
- Estimate the costs of provision of CL services
- Estimate the overall cost and consequences of provision of CL services to patients with D&A problems
- Identify, quantify and describe any changes to emergency department performance associated with the provision of enhanced funding for CL services

The objectives are addressed through four stages of analysis:

- Study One (presented in Section Two of this report): a survey of patients presenting to emergency departments and selected inpatient wards in eight NSW hospitals to determine the prevalence of drug and alcohol problems, and follow-up at three months of patients with drug and alcohol problems who had and had not received a CL service.
- Study Two, Time series analysis of aggregate administrative data (presented in Section Three of this report), to investigate differences between hospitals and, where possible, assess any impact of enhanced CL funding on hospital and emergency department key performance indicators, such as triage performance, length of stay and repeat presentations.
- Study Two, Patient level data analysis (presented in Section Four of this report): analysis of the patterns of service, health system resource use and costs over time for consenting patients in Study One who consented to provide access to their medical records. Health

system resource use includes presentations to ED, hospital admissions, as well as use of MBS and PBS services. The analysis is based on comparison of patients with and without drug and alcohol problems, and among those patients with drug and alcohol problems, comparison of patients who receive and do not receive CL services.

- Cost-consequences analysis (presented in Section Five of this report) based on estimation of the costs of provision of CL services as provided by the NSW LHD Drug and Alcohol Directors, and the estimated cost-offsets resulting from different patterns of health system resource use from provision of CL services (based on the analysis of Study Two).

The NSW Health MHDAO original study design included a set of objectives described in the "MHDAO Project Plan for Evaluation of Drug and Alcohol Consultation Services, July 2010". After NDARC and CHERE were commissioned to undertake the patient survey and economic evaluation, the evaluation plan was modified in consultation with CHERE, NDARC and the MHDAO. However, the majority of the original objectives have been addressed by the current evaluation. The original objectives and how they are addressed are detailed in Appendix 1, Section A.1.2 to this report.

1.3. Evaluation Plan

The evaluation involves comparison between outcomes for patients with drug and alcohol problems in hospitals that have and have not received enhanced funding for their D&A CL service. However, it was clear from an early stage of the evaluation that the extent and model of D&A CL services within hospitals was not solely determined by the provision of enhanced funding. Therefore, while the evaluation does involve some comparisons across hospitals that have and have not received enhanced funding, it also uses a range of other factors to assess the consequences of CL service.

The evaluation is comprised of two related studies, Study 1 (baseline and follow-up patient surveys) and Study 2 (economic evaluation) as described below:

Study 1:

Initially, the collaborative research team (NDARC and CHERE) undertook a series of consultations with staff of each of the participating D&A CL Services between November 2010 and May 2011. From these discussions it became evident that the operation of CL services did not differ primarily on the basis of whether the hospital had received enhanced funding or not, and this may not be the most effective way of assessing the impact of CL services. For example, two of the comparison sites – St Vincent's and Wollongong Hospitals – already had established CL Services. Given these concerns, it was agreed with NSW Health MHDAO that the evaluators would undertake a single patient study involving an initial baseline survey and a follow-up survey. [2]

The baseline survey sampled patients presenting to the ED and admitted overnight to select hospital wards over a 10-day period at eight hospital sites: Royal Prince Hospital, St Vincent's Hospital, John Hunter Hospital, Wollongong Hospital, Lismore Base Hospital, Orange Base Hospital, Albury Base Hospital and Campbelltown Hospital. Those patients identified by the survey as having a drug and alcohol problem, regardless of whether they were referred to CL services, (the D&A group) were followed up three months later to determine recall of D&A CL services and changes in substance use (the follow-up survey). Both the baseline and follow-up surveys were conducted by research interviewers employed through NDARC, or through the participating hospitals, but with supervision provided by a research co-ordinator who undertook regular quality control checks of the data collection process. Where consent was obtained, the baseline survey data for each individual was

[2] See CL Advisory Committee meeting minutes 14th February 2011, Proposal to Change Methodology February 2011, and May 2011 revised Project Plan and related ethics amendment.

linked to their hospital records, MBS and PBS data. This forms the cohort for the patient level analysis in Study 2, described in Table 1.2 below.

Table 1.2 Summary of data linkage for patient level data analysis, 18 months pre- to 12 months post-survey

Patient survey data	CL data	Inpatient and Emergency data	Medicare data (MBS and PBS)
Collected in Study 1	Matched by the CHERE research team using MRN*	Matched by the CHeReL[3] to capture presentations at multiple hospitals	Matched by Medicare

*The use of the Centre for Health Record Linkage (CHeReL) for matching CL data was also considered; however this proved too costly given the requirement for each health area in NSW to supply their CL databases to the CHeReL to facilitate this data linkage. Consequently, the CL data were matched by the research team using MRN which therefore limits the CL data capture to CL services provided by hospitals within the same health area as where the patient was surveyed. This may downwardly bias the estimated differences over time in Study 2, for patients with and without a CL consultation.

Study 2:

Study 2 is the cost-consequences component of the evaluation undertaken by CHERE, which considers:

i. At an aggregate level, whether there are differences in measureable hospital-wide outcomes due to Enhanced Funding of D&A CL services (ECL). This is assessed using interrupted time series analysis of data from routine data collections, including the Admitted Patient Data Collection (APDC) and Incident Information Management System (IIMS) data. As well as evaluating evidence of changes over time associated with the provision of enhanced funding, the aggregate hospital data analysis allowed for identification of underlying trends in drug and alcohol presentations, and for identification of any possible factors that might confound the patient level analysis and comparison across hospitals in terms of the impact of CL services.
ii. At the individual patient level, what is the impact of CL services? This is addressed using analysis of survey and unit record administrative data from a consenting sample of patients presenting to the included hospitals (collected in Study 1). The individual patient analysis compares ED presentations, inpatient admissions, PBS and MBS outcomes and associated costs over time for CL patients and non-CL patients with D&A problems, controlling for confounding factors identified in the aggregate hospital data analysis.

These outcomes are compared with the cost of providing CL services to estimate the overall cost and consequences of D&A CL Services in NSW hospitals.

[3] The CHeReL is an organisation that links multiple data sources using a system that maintains privacy. Further information can be obtained from http://www.cherel.org.au/

Section 2. Study 1

2.1. Patient Survey Data Analysis

The Patient Survey

The patient survey (baseline) was developed for this study and measures: the reason for presentation, contribution of substance use to current presentation, substance use in past 24 hours, recent problematic substance use, general functioning, and use of drug and alcohol services in the ED. Also included was a small number of patients from selected wards when they were unable to be recruited directly from the ED. For example, where hospitals had no emergency department or they were taken directly via ambulance to a ward.

The follow-up survey was undertaken by phone three months after the baseline and measures changes in substance use over this time, general functioning, and health service utilisation. For those participants who received a D&A CL consultation while in hospital, client perspectives on the impact of the CL intervention on their substance use and the uptake of referrals to drug and alcohol treatment was also measured.

Method

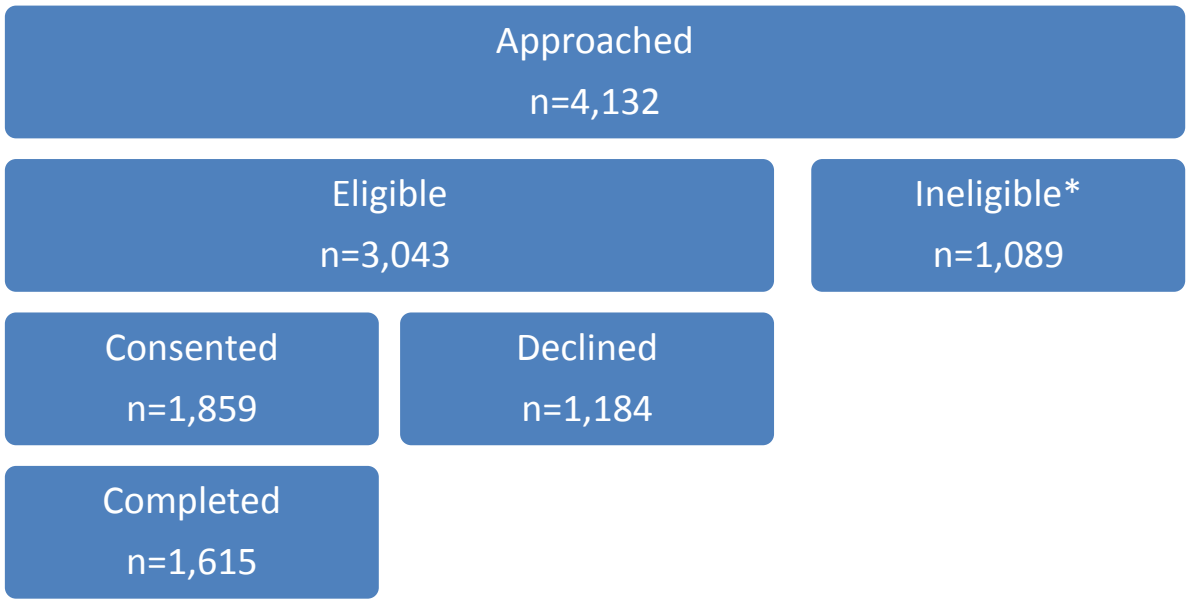
Patients presenting to Emergency department and selected wards at eight hospitals were approached and screened for eligibility. Eligible patients were those who were presenting for treatment for themselves, were over the age of 16 and able to provide informed consent.

The patient survey was conducted at the following eight NSW hospitals.

- Royal Prince Alfred Hospital – Sydney
- St Vincent's Hospital – Sydney
- John Hunter Hospital – Newcastle
- Wollongong Hospital – Wollongong
- Orange Health Service – Orange
- Lismore Base Hospital – Lismore
- Campbelltown Hospital – Campbelltown
- Albury Wodonga Health - Albury

Figure 2.1.1 summarises the recruitment to the study. A total of 4,132 potential participants were approached during the survey period. Of these, 3,043 were eligible and of these 1,615 consented to participate and completed the survey.

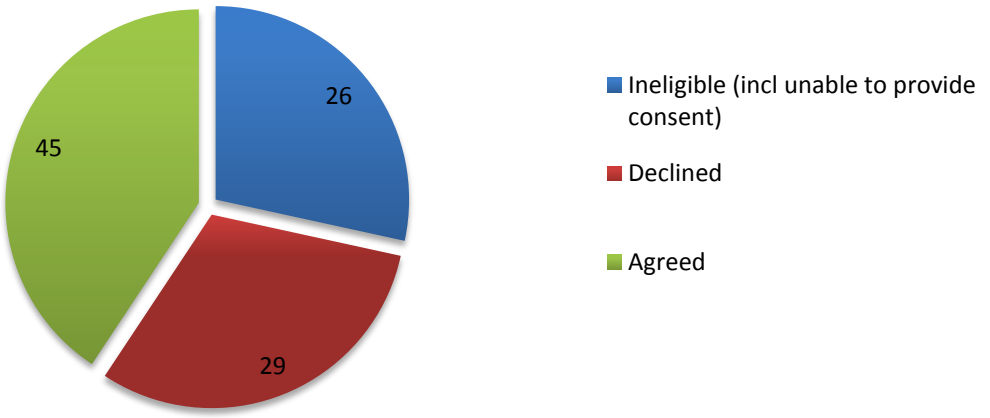
Figure 2.1.1 Patient survey participation



* To be eligible to participate, patients had to be over 16 and able to provide informed consent.

Patients who did not meet eligibility because they were heavily intoxicated, cognitively impaired, experiencing psychosis or unable to sufficiently comprehend English and hence unable to provide informed consent were excluded from the study. Ineligible patients accounted for 26% (n=1,089) of the potential participants approached during the survey period. A further 29% declined to participate (n=1,184).

Figure 2.1.2 Patients captured in the data collection period by participation category (n=4,132)



Intoxication rates are calculated as a percentage of the number of participants approached who were ineligible due to being intoxicated. Intoxication as a reason for exclusion ranged from 11% (n=57) at St Vincent's Hospital to 2% for Wollongong, Lismore and Campbelltown.

Demographics

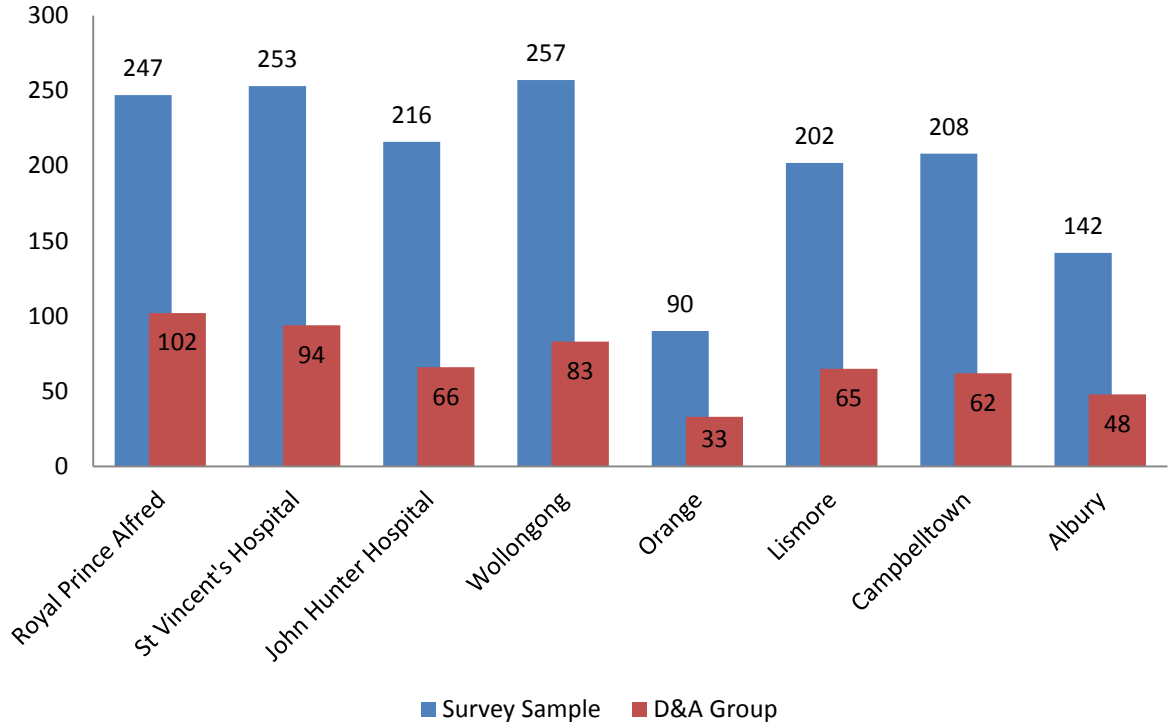
A total sample of 1,615 presentations was collected. Of this total sample, 53% were male and 5% identified as being of Aboriginal and Torres Strait Islander origin. Ages ranged from 16 to 98 with a mean of 41 years old.

Prevalence

To determine the proportion of presentations where drug and alcohol use was a contributing factor and the proportion of patients with a recent substance use problem the Alcohol, Smoking and Substance Involvement Screening Test (ASSIST) was used. We will call this the D&A group. The ASSIST was developed for the World Health Organization (WHO) by an international group of substance abuse researchers to detect and manage substance use and related problems in primary and general medical care settings. The ASSIST screens for low, moderate and high risk substance use for any substance. The current study did not evaluate issues related to smoking.

The D&A group in this study comprised those who (1) scored positive for substance use on the ASSIST on any, or multiple substances, and (2) were classified as being in need of some level of intervention for that substance use.

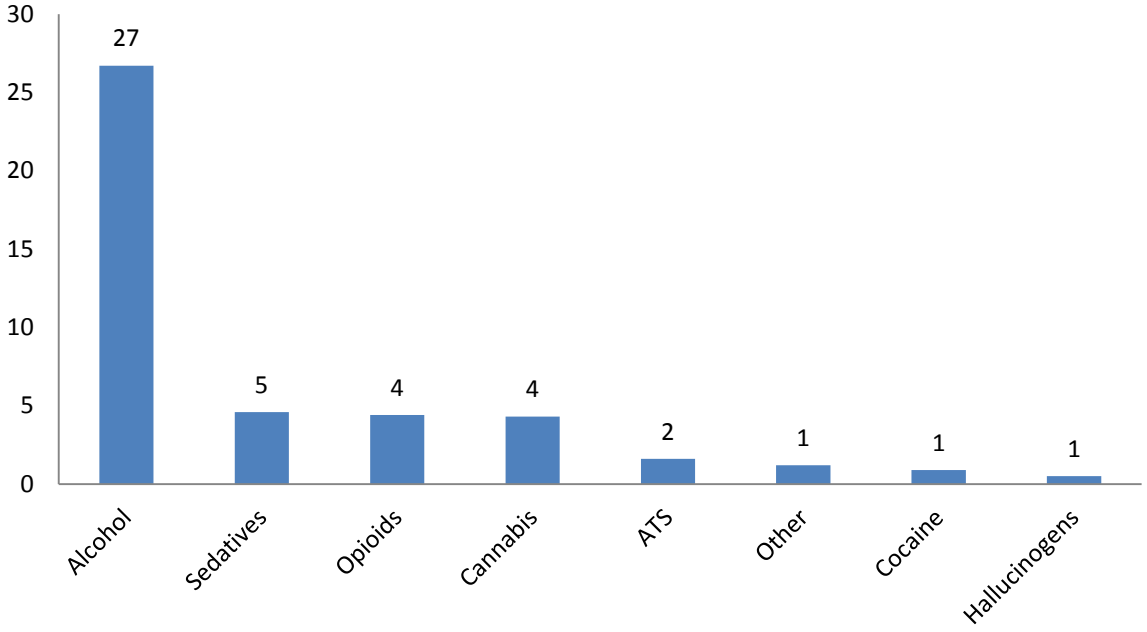
Figure 2.1.3 Total sample and the D&A group as identified with the ASSIST by hospital



Of the total 1,615 surveys completed, 35% screened positive for problematic substance use. (n=553). Given that intoxication was an exclusion criterion this is likely a conservative estimate of prevalence.

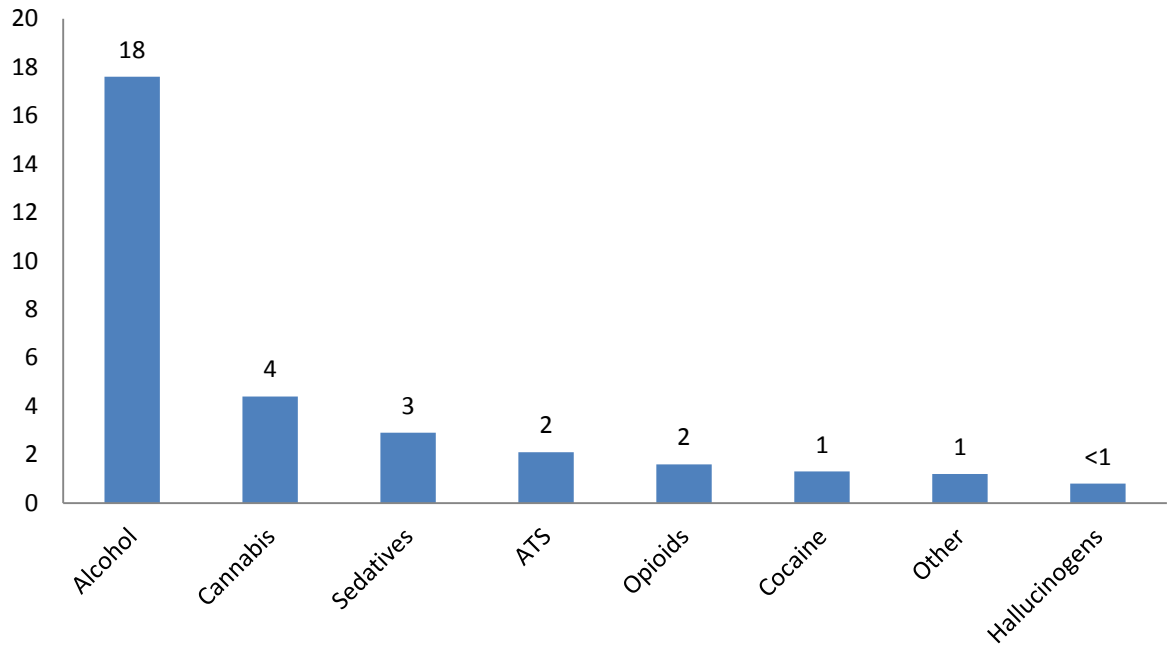
The remainder of this section discusses a number of key variables of interest from the baseline survey: (1) whether patients had used substances in the 24 hours prior to presentation; (2) whether they considered substance use as contributing to their presentation, (3) whether they were identified as having problematic substance use using the ASSIST instrument and (4) their use of alcohol and drug services.

Figure 2.1.4 Self-reported substance use in the past 24 hours (%) by type of substance used (n=1,615)



As reported in Figure 2.1.4 the substances most commonly used in the past 24 hours were alcohol 27%, sedatives 5% and opioids and cannabis (both 4%).

Figure 2.1.5 Substance use reported as contributing to presentation, by substance type (n=1,615)



Participants were also asked whether they thought their substance use contributed to their presentation. As noted in Figure 2.1.5 the substances most commonly reported as contributing to their presentation were alcohol (18%), cannabis (4%) and sedatives (3%).

Defining the D&A Group

To assess problematic substance use, the Alcohol, Smoking and Substance Involvement Screening Test (ASSIST) was used. The Alcohol, Smoking and Substance Involvement Screening Test (ASSIST) was developed for the World Health Organization, WHO ASSSIST (1992) by an international group of substance abuse researchers to detect and manage substance use and related problems in primary and general medical care settings. The ASSIST screens for problem or risky use of tobacco, alcohol, cannabis, cocaine, amphetamine type substances, sedatives, hallucinogens, inhalants, opioids and 'other' drugs. The ASISST obtains information from clients about lifetime use of substances, and use of substances and associated problems over the last 3 month.

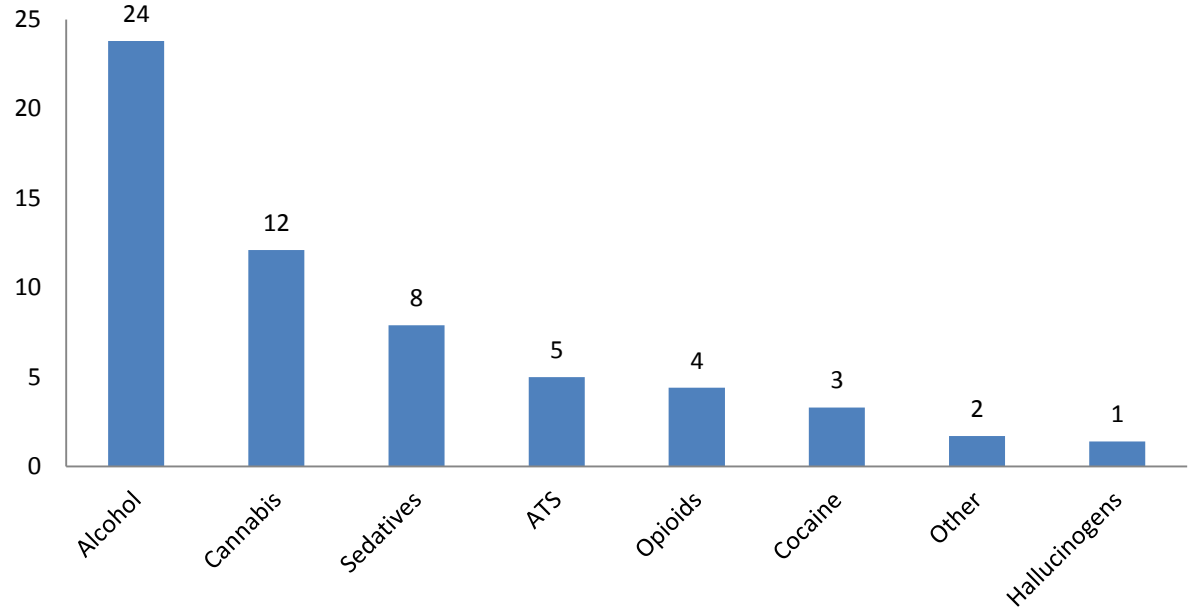
The sum of the response weights to these questions produces a Specific Substance Involvement Risk score. It can identify a range of problems associated with substance use including acute intoxication, regular use, and dependent or 'high risk' use and injecting behaviour. The ASSIST instrument is scored using a simple scoring method whereby the score obtained for each substance falls into a 'lower', 'moderate' or 'high' risk category which determines the most appropriate intervention for that level of use ('no treatment', 'brief intervention' or 'referral to specialist assessment and treatment' respectively).

The D&A group in this study included participants who (1) scored positive for substance use on the ASSIST on any, or multiple substances, and (2) were classified as being in need of some level of intervention for that substance use.

Thirty-five percent of the total sample screened positive for problematic substance use and were classified as being in need of some level of intervention for that substance use. Poly-substance use was common among the sample with 12% of the total sample screened positive for problematic substance use for two or more substances.

Of the total sample, as shown in Figure 2.1.6; alcohol, cannabis and sedatives were the substances most commonly identified as in need of some level of intervention.

Figure 2.1.6 Proportion of the total sample that screened positive for problematic substance use on the ASSIST, by substance type (n=1,615)



With respect to the type of intervention required, 32% of the total sample screened positive for problematic substance use requiring a brief intervention and 7% screened positive for problematic substance use requiring more intensive treatment. There was a subset of participants who screened positive for *both* a brief intervention for one or more substances *and* more intensive treatment for one or more substances. (4%, n=66) For example; a participant may screen positive for needing a brief intervention for cannabis but may also screen positive for needing an intensive treatment for alcohol.

Demographics

Compared to the non D&A group, the D&A group were more likely to be male ($p<0.001$), younger, identify as ATSI and have a poorer disability score (see Figure 2.1.7). In the D&A sample, 63% were male compared with 49% of the non-D&A group being male. The mean age of the D&A sample was 37 years and the Non-D&A group was 43 years of age. This difference is statistically significant ($p<0.001$).

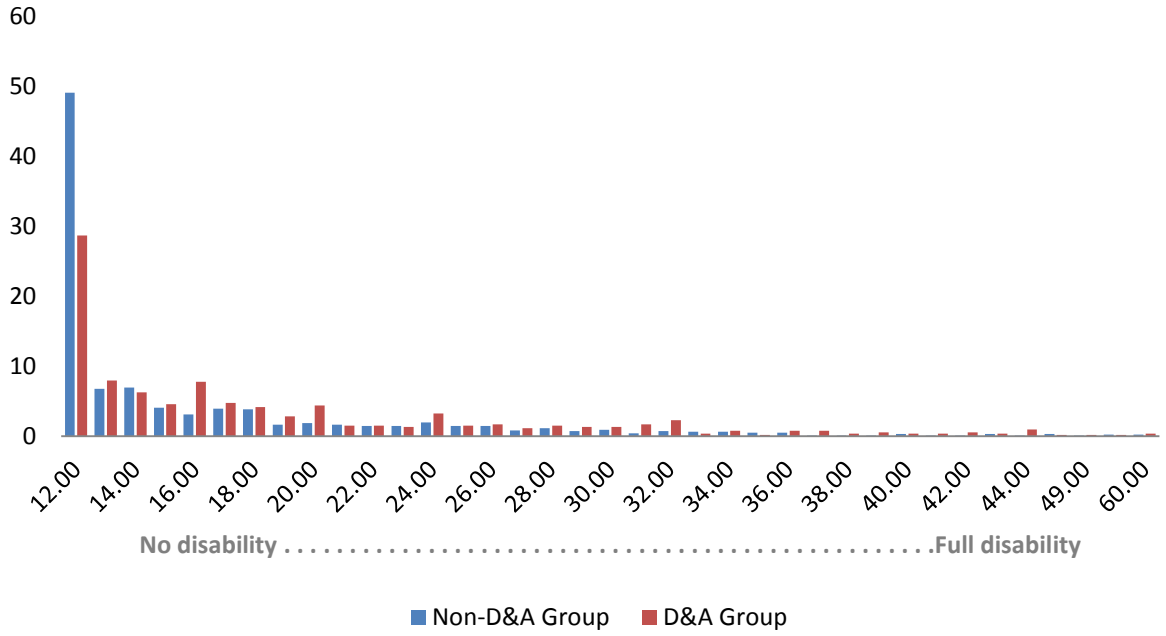
Disability Assessment Schedule

The WHO Disability Assessment Schedule (WHODAS 2.0) was included in the survey as a generic assessment of health and disability. It has been developed for use across all diseases, including mental, neurological and addictive disorders. The 12-item version was included as a brief assessment of overall functioning. The summary scores for the WHODAS 2.0 were computed using 'simple

scoring' which returns a value across all domains that constitutes a statistic that is sufficient to describe the degree of functional limitations. The range of scores is from 12 (no disability) to 60 (full disability).

The graph below represents the difference in the disability scores between the D&A group and the non-D&A group.

Figure 2.1.7 WHODAS 2.0 Disability scores (n=1615)

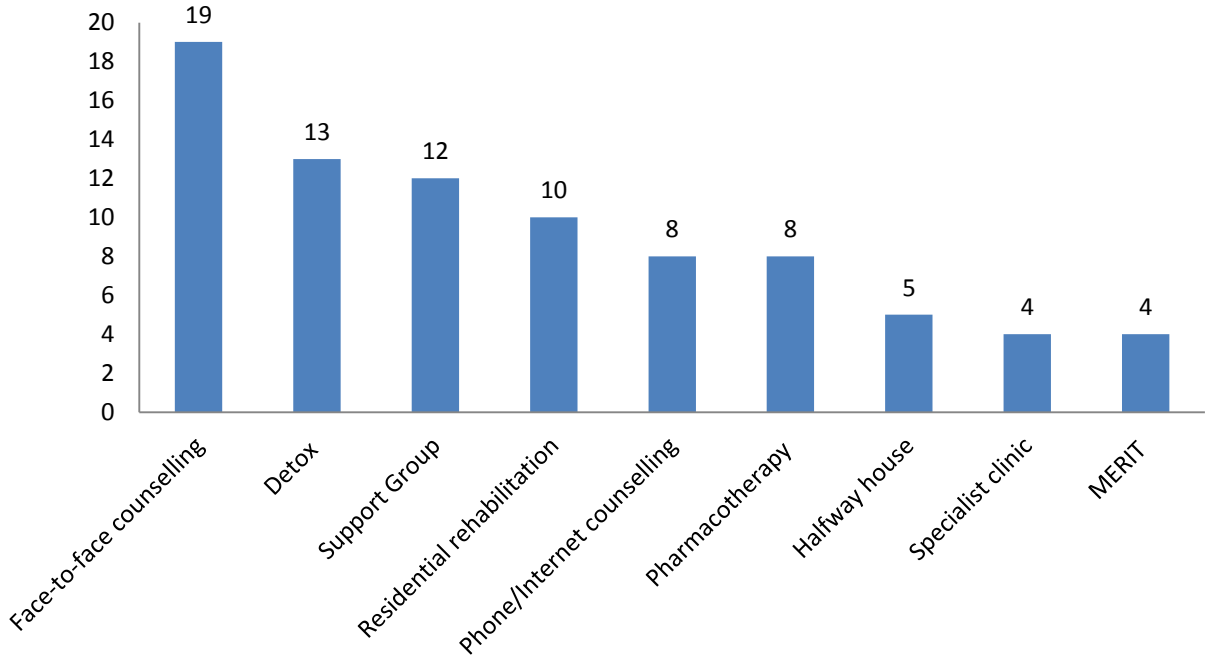


The WHODAS group median scores showed that the D&A group and the non-D&A group had statistically different levels of disability (p<0.001). As shown in Figure 2.1.7 a higher proportion of the non-D&A group had lower disability scores.

D&A Service Access

Among the D&A group, service utilisation for substance use was low; 75% of the group had never accessed any type of substance use service. Of those who had used a service previously, the most commonly used services were face to face counselling (19%), detoxification services (13%) and support groups (12%).

Figure 2.1.8 % D&A group substance use service utilisation, by service type (n=553)



2.2. The follow-up survey

The follow up survey was designed to examine whether patients who had been identified by the ASSIST at baseline as being in need of some level of intervention received a CL consultation or had CL in some way involved in their care.

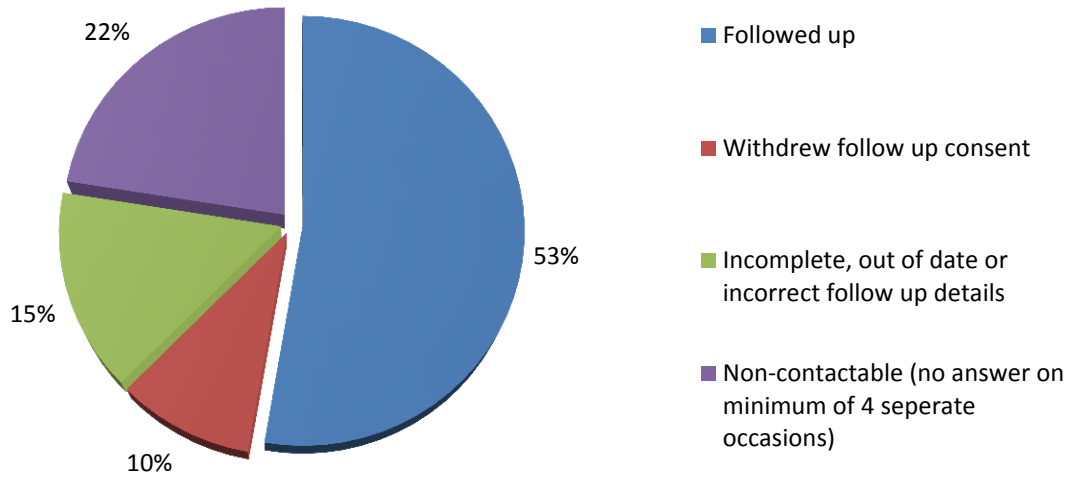
Method

Patients who were in the D&A group and screened positive on the ASSIST were followed up by a phone survey three months post baseline. The follow-up survey measured changes in substance use since baseline survey, general functioning, and health service utilisation. For those participants who received a D&A CL consultation while in hospital, perspectives on the impact of the CL intervention on their substance use and the uptake of referrals to drug and alcohol treatment was also measured.

In summary, of the 1,615 baseline sample, 553 screened positive for substance use problems and were allocated to the D&A group. From this group 352 consented to follow-up 3 months post baseline survey.

Reasons for non-retention of the follow-up group are demonstrated below.

Figure 2.2.1 Follow up and reasons for non-follow-up



Demographics

Of those followed up, 63% were male and 4% identified as being of Aboriginal and Torres Strait Islander origin. Ages ranged from 17 to 90 years of age with a mean of 40 years old.

D&A use

The ASSIST was administered again to this group to investigate whether drug and alcohol use had changed in this group since their baseline survey. Thirty-seven percent of the follow up group of participants **no longer screened positive** for substance use problems according to the ASSIST. Those participants who remained in need of some intervention for their substance use (as defined by the ASSIST instrument) were found to have significantly reduced the frequency of substance use from baseline measures ($p<0.001$). Fifty-three percent of this group used substances at a high frequency at baseline which reduced to 29% of the sample at follow up. High frequency use was defined as daily or almost daily use.

Disability Assessment Schedule

The WHO disability assessment schedule was included in the follow up survey to determine if participants who no longer met criteria for substance use problems had also reduced their disability scores. Respondents who no longer met D&A criteria reduced their disability measure to a median of 13.0 from 13.5 but this was not found to be statistically significant ($Z = -0.831$, $P = 0.406$). There was, however, an interaction between substance use and disability. Participants who no longer met criteria for substance use problems were found to have had better disability scores at baseline $r(120) = 0.32$, $p<0.01$. While this level of relationship is only moderate, with a small sample size of 122 it may be that there is a connection between disability scores at baseline and an improvement in substance use at follow up.

D&A Service Access

Eight percent of the follow up sample reported being referred to substance use services by hospital staff (n=11) while 15% reported having accessed drug and alcohol services since baseline (n=20). The most common service that was both referred to and accessed was face to face counselling, with 11% reporting using this type of service. Caution is advised interpreting these results due to the small numbers

CL vs Non-CL

To compare outcomes for those that received a CL visit and those in the D&A group who did not receive a CL visit, it was proposed to use CL administrative data to confirm whether CL was involved in the patient's care. Using this method, only seven participants in the follow up group also had administrative CL data. Given this small number no further analysis was undertaken.

Section 3. Study 2, Hospital level EDIS, APDC and IIMS data analysis

3.1. Hospital level analysis of Emergency Department Information System (EDIS) data

The aim of the hospital level analysis of EDIS data was to provide information about underlying trends in drug and alcohol (D&A) and other presentations in the hospitals to be included in the evaluation, as a point of comparison and to inform the structure of the individual level data analysis to be undertaken in the second stage of the evaluation (i.e. the patient level analysis).

The hospital level EDIS data were provided by the Demand and Performance Evaluation Branch of NSW Health, in accordance with the data request developed by the evaluators. Three key types of data were requested, for emergency department presentations:

- the number and type of D&A presentations to the study hospitals over the period 2005-2010;
- the overall numbers of presentations to the study hospitals over the same period;
- a range of hospital performance indicators over this period for D&A and non-D&A presentations.

Data were provided for each hospital on a per month basis for the period January 2005 to June 2010 for 15 hospitals: St Vincent's, Wollongong, Royal Prince Alfred, Concord Repatriation General, Liverpool, Campbelltown, John Hunter, Albury Base, Wagga Wagga Base, Goulburn Base, Orange Base, Dubbo Base, Bathurst Base, Lismore Base, and Westmead Children's hospitals. Data beyond July 2010 had not been fully cleaned and validated by the Data and Performance Evaluation Branch, and therefore were excluded.

To undertake the aggregate analysis of D&A patients, a list of ICD-10 (International Classification of Diseases, 10th revision) codes was developed which best captures this group of patients. This list was based on previous research undertaken by NDARC (Roxburgh and Degenhardt, 2006), which provided ICD-9 and ICD-10 Codes for four specific drug types. Their list was expanded to include alcohol and other drugs in order to generate a full list of drug and alcohol patients for inclusion in the study. The set of ICD10 codes included in the data request covers F10.0 to F19.9, T40.0 to T40.9, T43.6, T42.4, T51.0 to T51.9, Z72.0 to Z72.2.[4] As some hospitals use ICD-9 or SNOMED-CT (Systemised Nomenclature of Medicine Clinical Terms) codes rather than ICD-10, it was necessary to

[4] Definitions provided in Appendix 1, Table A.3.1

obtain a mapping from ICD10 to ICD9 and SNOMED codes, to ensure that the data request covered a similar group of patients across all the hospitals included in the request. Advice from the Demand and Performance Evaluation Branch of NSW Health was that that caution be applied in mapping between SNOMED and ICD-10 codes. This is because the descriptive system within SNOMED is very different from that for ICD-10. Furthermore, changes in ED coding systems from ICD to SNOMED in 2007 in 11 of the 15 hospitals, made it unfeasible to analyse differences within and between hospitals before and after enhanced funding.

It should also be noted that patients with drug and alcohol related presentations and diagnoses only represent a small proportion of patients with underlying D&A problems, as is evident from the patient survey data analysis. This is reported on in Section 4.

Data analysis and results

Given the above data limitations, the hospital level EDIS data analysis was restricted to descriptive comparisons as it was not possible to disentangle the impact of coding changes from the impact of funding changes. The analysis focused on the total number of ED presentations and the number of ED presentations where the primary diagnosis is related to alcohol or other drugs. Descriptive statistics were also considered for various population groups including males and females, people from an Aboriginal or Torres Strait Islander background and age group. The relative numbers of D&A related ED presentations to overall ED presentations for the selected hospitals was examined.

Emergency Departments Presentations

Between 2005 and 2009, the number of ED presentations grew by around 20% in the 15 hospitals in our data set, peaking in 2009 with little change in the first half of 2010. By contrast, the number of D&A related presentations peaked in 2007 and appears to have fallen since then. In all years, Primary D&A diagnoses account for less than 1% of all ED presentations in the 15 hospitals in our dataset. Further examination of D&A presentations in six selected hospitals shows considerable differences between hospitals (see Table 3.1). For example in the John Hunter Hospital at Newcastle, D&A presentations account for less than 0.4% of all ED presentations. At St Vincent's in inner Sydney, this percentage is as high as 5%. The trend over time also varies by hospital. At St Vincent's the percentage of D&A presentations has increased over the entire observation period. At hospitals such as Orange and John Hunter the percentage has been relatively stable and at RPA, Lismore and Wollongong hospitals, the percentage peaked in 2007 and has fallen since. However, the drop

between 2007 and later years is likely to reflect the change from ICD to SNOMED coding at these hospitals rather than underlying changes in presentations.

Table 3.1 ED presentations in six hospitals, with and without enhanced funding

	Enhanced funded			Non-enhanced funded		
year	Royal Prince Alfred			St Vincent's		
	All	D&A	%	All	D&A	%
2005	48,090	902	1.88	33,624	1,065	3.17
2006	52,117	984	1.89	37,301	1,388	3.72
2007	57,185	946	1.65	41,152	1,762	4.28
2008	59,097	517	0.87	41,183	1,903	4.62
2009	62,391	498	0.80	40,906	1,876	4.59
2010*	31,230	274	0.88	20,701	1,050	5.07
Total	310,110	4,121	1.33	214,867	9,044	4.21
year	**Orange**			**Lismore**		
	All	D&A	%	All	D&A	%
2005	24,168	147	0.61	25,607	159	0.62
2006	24,834	170	0.68	26,714	204	0.76
2007	27,263	169	0.62	28,725	219	0.76
2008	27,425	190	0.69	29,288	211	0.72
2009	27,552	152	0.55	29,721	127	0.43
2010*	13,172	70	0.53	14,875	54	0.36
Total	144,414	898	0.62	154,930	974	0.63
year	**John Hunter**			**Wollongong**		
	All	D&A	%	All	D&A	%
2005	54,317	193	0.36	41,554	261	0.63
2006	56,463	239	0.42	45,475	328	0.72
2007	60,636	207	0.34	49,495	337	0.68
2008	61,178	216	0.35	50,342	410	0.81
2009	62,787	270	0.43	50,925	241	0.47
2010*	31,959	114	0.36	25,512	106	0.42
Total	327,340	1,239	0.38	263,303	1,683	0.64

*Note: * 2010 data includes presentations between January and June 2010 only*

Mental and behavioural disorders related to alcohol use were responsible for the vast majority of D&A presentations to the selected hospitals, except the Children's Hospital, where the majority of presentations were coded as toxic effects of alcohol, tobacco and other drug use. For a detailed breakdown of D&A presentations by major diagnostic category refer to Appendix 1, Figure A.3.1.

The hospital level EDIS data showed that D&A presentations are more common amongst males than females and amongst those from an Aboriginal and Torres Strait Islander background compared to the general population, particularly in inner Sydney hospitals. The highest percentage of D&A presentations is in the 15 to 19 year old age group at 1.7% of presentations for this age group from 2005 to 2010. The percentage is just over 1.5% for 30 to 39 and, 40 to 49 year olds. It then drops to around 0.5% for those aged 60 to 69 and 0.13% for those aged 70 and over. These descriptive results, summarised in Table 3.2, provide a strong justification for the patient level analysis to control for age, gender and Indigenous status.

Table 3.2 Presentations with primary D&A diagnosis in 15 hospitals, January 2005 to June 2010, by patient characteristics

Patient Characteristic	Number of presentations	Number of presentations with D&A primary diagnosis	D&A as percentage of presentations
All patients	3,109,702	26,511	0.85%
Male	1,656,894	16,581	1.00%
Female	1,452,495	9,921	0.68%
ATSI	110,336	1,879	1.70%
Age 0 to 14	796,611	547	0.07%
Age 15 to 19	216,356	3,670	1.70%
Age 20 to 29	467,673	7,191	1.54%
Age 30 to 39	377,542	5,695	1.51%
Age 40 to 49	310,524	4,875	1.57%
Age 50 to 59	264,149	2,748	1.04%
Age 60 to 69	223,640	1,144	0.51%
Age 70 and over	452,559	597	0.13%

Note: The sum of all age groups and of male and female presentations does not equal all patient presentations due to missing information on age and gender in some cases.

Implications for the evaluation

Overall the hospital level analyses of EDIS data indicated that only a small proportion of patients received a D&A diagnosis during their presentation. D&A diagnoses were more common in major urban hospitals and more common amongst males, younger adults, and Aboriginal and Torres Strait Islanders. These differences highlighted the need for the subsequent patient level data analyses to control for age, sex, Indigenous status, and hospital level heterogeneity. These are all controlled for in the baseline patient level analysis presented in Section 4.3 of this report.

3.2. Hospital level time series analysis of Admitted Patient Data Collection (APDC) data

Data and methods

The analyses reported in this section use admitted patient data per month per hospital from January 2005 to December 2010, for 12 hospitals with enhanced funded CL services (ECL) and 3 hospitals without enhanced funded CL services (non-ECL). For ECL hospitals we conducted interrupted time series analysis to test whether there are significant differences in trends over time in selected outcomes before and after enhanced funding. Within each hospital we compared trends for patients with a drug and alcohol diagnosis (D&A patients) and trends for all patients. Trends over time are also generated for non-ECL hospitals to provide comparisons of trends between ECL and non-ECL hospitals. The group of D&A patients was determined by primary or additional diagnosis according to the following ICD10 codes: F10.0 to F19.9, T40.0 to T40.9, T43.6, T42.4, T51.0 to T51.9, and Z72.0 to Z72.2. The outcomes examined include: percentage of separations with a D&A diagnosis; urgency of separations; average length of stay. The hospitals included in the analysis, and each hospital's ECL status, are provided in
Table 1.1 in Section 1 of this report. As previously, where two dates are reported, we use the latter date as the time of commencement of ECL.

The previous analysis of aggregate hospital level ED data revealed a large amount of variation according to patient characteristics. Therefore, the regression analyses of APDC data reported here controlled for age, sex and Indigenous status. We also control for seasonal variation in drug and alcohol consumption, consistent with recent evidence reported by Victoria Health that the months from November to April are peak times for Alcohol related harm, coinciding with warmer temperatures and festivities (Lloyd et al., 2011).

The ARIMA regression results showing the direction of change for the ECL shift dummy and ECL time variables are summarised in Table 3.3. The results by outcome type per hospital are reported graphically for ease of interpretation in Appendix 1, Section A.3.2. Corresponding statistical output is available from CHERE on request. Each graph shows raw data points over time and predicted outcomes from two regression models: one ordinary least squares (OLS) model, and one ARIMA model which controls for 3 period lagged effects. In each graph for an ECL hospital, the time of commencement of the enhanced funded service is indicated by a vertical dotted line. The statistical results discussed under each graph are based on the ARIMA model.

Table 3.3 APDC ARIMA regression results summary, showing direction of change since ECL

Hospital	Variable	% of separations with D&A diagnosis	% of D&A separations classified urgent	% of All separations classified urgent	ALOS for D&A separations	ALOS for All separations
Albury	ECL dummy					
	ECL time		Increase (p=0.009)			
Bathurst	ECL dummy	Decrease (p=0.054)	Increase (p=0.001)			Decrease (p=0.028)
	ECL time		Decrease (p=0.025)			
Campbelltown	ECL dummy		Decrease (p=0.001)	Decrease (p=0.000)		Decrease (p=0.000)
	ECL time	Decrease (p=0.002)		Increase (p=0.086)		
Concord	ECL dummy				Increase (p=0.000)	
	ECL time					Increase (p=0.015)
Dubbo	ECL dummy					
	ECL time	Decrease (p=0.006)				
Goulburn	ECL dummy	Increase (p=0.058)				
	ECL time		Increase (p=0.043)	Increase (p=0.088)		
John Hunter	ECL dummy				Decrease (p=0.017)	
	ECL time	Decrease (p=0.001)				Decrease (p=0.097)
Liverpool	ECL dummy	Decrease (p=0.000)				
	ECL time	Increase (p=0.000)			Decrease (p=0.009)	
Orange	ECL dummy	Increase (p=0.034)			Increase (p=0.036)	
	ECL time		Increase (p=0.002)	Increase (p=0.000)		
RPAH	ECL dummy	Increase (p=0.029)				
	ECL time					Increase (p=0.000)
Wagga Wagga	ECL dummy					
	ECL time		Increase (p=0.041)		Increase (p=0.001)	Increase (p=0.002)
Westmead Children's	ECL dummy		Increase (p=0.003)			
	ECL time					Decrease (p=0.000)

Note: 2 sided significance test, α=5%. P values also reported where approaching significance (α=10%). Results for each hospital are also reported graphically in Appendix 1, Section A.3.2.

Summary of results and conclusions of aggregate data analysis of APDC

Interrupted time series analysis of the percentage of separations with a primary or additional D&A diagnosis indicates significant differences following commencement of enhanced funding in 8 out of 12 hospitals with enhanced funded CL services (ECL). In Campbelltown, Dubbo and John Hunter hospitals there has been a significant decrease over time in separations with a D&A diagnosis which suggests that ECL may have decreased the frequency of repeat D&A admissions over time at these hospitals. At Bathurst and Liverpool hospitals there was evidence of a downward shift in D&A admissions after ECL, which suggests that admissions with a D&A diagnosis decreased immediately after ECL. At Goulburn, RPA and Orange hospitals there is evidence of an increase (i.e. an upward shift as opposed to a change in trend over time) in admissions with a D&A diagnosis following the commencement of ECL. This may indicate either that ECL had an immediate impact in terms of patients with D&A problems being more likely to receive a D&A diagnosis or it may reflect an actual increase in presentations for D&A.

The analyses of urgency of presentations and average length of stay do not show any convincing evidence of changes due to ECL. Not only are the results mixed, but in many cases there have been similar changes for all patients as for D&A patients, whereas enhanced funding would be expected to have a greater impact on patients with a D&A diagnosis (not withstanding that not all patients with an underlying D&A are admitted with a D&A diagnosis).

3.3. Hospital level analysis of Incident Information Management System (IIMS) data

An objective of the evaluation is to identify and quantify any reduction in the number and severity of behavioural incidents and assaults on staff. It was not feasible to link the patient survey data to IIMS data because reporting of MRN is not mandatory in IIMS, therefore this analysis focussed on whether there was a difference in the frequency of clinical incidents after the introduction of enhanced funded CL services. This was based on interrupted time series analysis of hospital level IIMS data.

Fourteen hospitals were included in the aggregate IIMS data analysis: Wollongong, Royal Prince Alfred, Concord Repatriation General, Liverpool, Campbelltown, John Hunter, Albury Base, Wagga Wagga Base, Goulburn Base, Orange Base, Dubbo Base, Bathurst Base, Lismore Base, and Westmead Children's hospitals. St Vincent's Hospital was excluded as they do not use IIMS.

Data on the number, type and severity of incidents were provided per hospital per month from January 2005 to November 2011. Separate data were provided for Clinical Incidents; Complaints; Property, Security, Hazard (PSH); and Staff, Visitor, Contactor (SVC) databases. These cannot be combined because an incident may be recorded in more than one database. For each hospital and each database, data were provided for all patients and for Drug and Alcohol Service patients only.

Descriptive statistics utilise IIMS data from all 14 hospitals. The time series regression analysis included the 12 hospitals with enhanced funded CL services, as identified in
Table 1.1 in Section 1 of this report. The purpose of this was to investigate whether there were any changes in trends for reported incidents following the introduction of enhanced funding.

Data analysis and results

The IIMS data analysis covered two main areas:

- Descriptive statistics comparing the number of IIMS incidents for D&A service patients with incidents for all patients, to identify in which incident types patients with D&A problems are most likely to be represented.
- Regression analysis of trends in selected incidents per hospital to identify changes in incidents since the commencement of enhanced funded CL services.

Descriptive Statistics

D&A Service patients are only a small proportion of total patients and are only a sub-sample of patients with D&A problems; however, they are a known subset of D&A patients. Consequently, for each incident type, comparing numbers of IIMS incidents for D&A service patients with total numbers of incidents indicates the incident types in which D&A patients are likely to be over-represented. If the introduction of ECL impacts on the frequency of incidents then this is most likely to be observed in those incident types where D&A patients are over-represented.

The majority of all incidents in IIMS are reported in the Clinical Incidents database. The proportion of D&A service patients is similar in the Clinical Incidents and Complaint Incidents databases, higher in PSH Incidents and lowest in the SVC Incidents databases (see Appendix 1, Table A.3.2). Within Clinical Incidents data, D&A service patients are overrepresented in behavioural incident types. The data show that 32% of reported Clinical Incidents for D&A service patients are behavioural incidents, whereas only 4% of all Clinical Incidents are behavioural incidents (see Figure 3.3.2 and Figure 3.3.1)

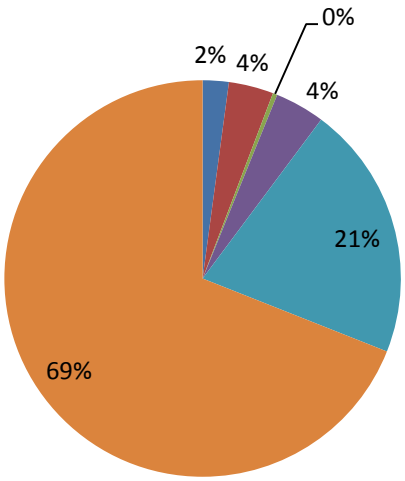


Figure 3.3.2 Clinical incidents by principle incident: all incidents

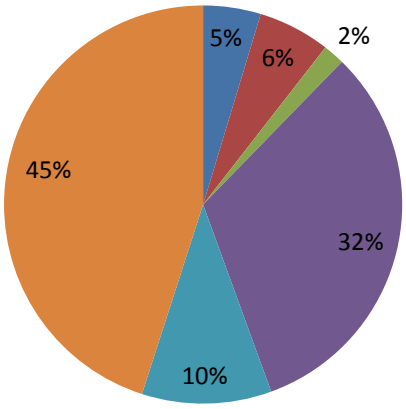


Figure 3.3.1 Clinical incidents by principal incident, D&A service patients

Trends in Incidents

We examined trends in four incident types where the descriptive statistics indicated patients with D&A issues were most likely to be represented. These included Total Clinical Incidents, Behavioural Type Clinical Incidents, Total Complaint Incidents and Total PSH Incidents. Using ARIMA regression models, interrupted time series analyses were undertaken for each hospital that receives enhanced funding for D&A CL services, taking into account the timing of introduction enhanced funded CL services (ECL).[5] Where two dates were reported, we use the latter date as the time of commencement of ECL.

The ARIMA regression results showing the direction of change for the ECL shift dummy and ECL time variables are summarised in Table 3.4. Corresponding statistical output is available from CHERE on request. Overall, the regression results indicate that ECL is associated with a reduction in reported incidents in IIMS. Statistically significant decreases (at the 5% significance level) since the commencement of ECL were found in 9 out of 12 hospitals for at least one of the four incident types analysed. The evidence is greatest at RPA, in which all 4 incident types exhibited a significant decrease following the introduction of ECL. This may in part be due to the larger sample at this hospital. Differences in the results for different hospitals may also reflect differences in how enhanced funding is used. Graphical representation of the regression results at each hospital can be found in Appendix 1, Section A.3.3. For each hospital there are four graphs, illustrating the regression results for total clinical incidents, behavioural clinical incidents, total complaints and total PSH incidents. A dotted line in each graph indicates the commencement time of ECL. The ARIMA results are discussed under each graph.

Table 3.4 IIMS ARIMA regression results summary, showing direction of change since ECL

Hospital	Variable	Clinical Total Incidents	Clinical Behavioural Incidents	Complaint Total Incidents	PSH Total Incidents
Albury	**ECL dummy**				
	ECL time			Decrease (p=0.021)	Decrease (p=0.074)
Bathurst	**ECL dummy**			Decrease (p=0.059)	
	ECL time				
Campbelltown	**ECL dummy**		Decrease (p=0.028)		

[5] ARIMA models were used to control for autocorrelation and seasonality in the data. A shift dummy variable and interaction term for introduction of ECL were included in the models. For further explanation of the methodology refer to Appendix 1, Section A.3.3, "Detailed methods for IIMS data analysis".

	ECL time	Decrease (p=0.065)	Decrease (p=0.007)		Decrease (p=0.000)
Concord	**ECL dummy**				Decrease (p=0.083)
	ECL time				
Dubbo	**ECL dummy**	Increase (p=0.069)	Increase (p=0.004)		
	ECL time		Decrease (p=0.011)		
Goulburn	**ECL dummy**				
	ECL time	Decrease (p=0.047)		Decrease (p=0.002)	Decrease (p=0.070)
John Hunter	**ECL dummy**				Decrease (p=0.007)
	ECL time				Decrease (p=0.001)
Liverpool	**ECL dummy**	Increase (p=0.009)	Decrease (p=0.032)		Decrease (p=0.085)
	ECL time	Decrease (p=0.047)			
Orange	**ECL dummy**			Decrease (p=0.078)	
	ECL time			Decrease (p=0.000)	
RPA	**ECL dummy**		Decrease (p=0.040)	Decrease (p=0.000)	Decrease (jointly significant) (p=0.04)
	ECL time	Decrease (p=0.010)			
Wagga Wagga	**ECL dummy**	Increase (p=0.000)			
	ECL time	Decrease (p=0.050)			
Westmead Children's	**ECL dummy**	Decrease (p=0.079)			
	ECL time				

Note: 2 sided significance test, α=5%. P values also reported where approaching significance (α=10%). Results for each hospital are also reported graphically in Appendix 1, Section A.3.3.

Section 4. Study 2, Patient level data analysis – 18 months pre- to 12 months post-survey

4.1.The Data

The patient level data analysis includes EDIS, APDC and CL data for patients from Study 1 who consented to NSW Health record data extraction and provided sufficient information to facilitate data linkage. For those patients who also provided consent for Medicare data extraction, analysis of MBS and/or PBS data is also undertaken. The data cover the period of 18 months prior to the patient survey to 12 months post the survey.

In November 2012, CHERE provided identifying information to the Centre for Health Record Linkage (CHeReL) for Study 1 participants who consented to NSW health data linkage for Study 2. The CHeReL undertook the APDC and EDIS data linkage for the final analyses in order to capture data from patients who presented or were admitted to multiple hospitals; these data would not be captured if we matched the data ourselves using MRN. The data linkage was undertaken by CHeReL at the end of January 2014, with the linked EDIS and APDC data subsequently provided by the data custodians to the evaluation team in March 2014.

For Study 1 participants who consented to health data linkage, CL data were provided by Local Health District CL data coordinators for 7 of the 8 participating hospitals (this excludes Lismore Hospital which is serviced by Riverlands Drug and Alcohol CL services). The CL data provided by the seven sites with hospital D&A CL services were linked to the patient survey data using MRN. A summary of the CL data extraction is provided in Table 4.1.

Table 4.1 CL data extraction

Hospital	Patients surveyed (Study 1)	Identified with D&A problems (Study 1)	Consenting patients with MRNs	Patients included in Study 2	Study 2 patients with D&A problems	Study 2 patients with CL data*
RPA	247	102	176	172	75	4
Campbelltown	208	62	147	145	53	12
Orange	90	33	77	70	26	1
Albury	142	48	135	129	46	2
John Hunter	216	66	166	159	48	3
Wollongong	257	83	219	215	69	10
Lismore	202	65	76	76	28	N/A
St Vincent's	253	94	142	135	57	7
Totals	**1615**	**553**	**1138**	**1101**	**402**	**39**

*Notes: * This is the number of consenting patients with MRN from Study 1 with at least one CL referral in the 30 month (18 months pre to 12 months post survey) extraction period.*

Approximately 10% of people in study 2 who screened positive in the survey for D&A problems received a D&A CL intervention during the evaluation period (39 out of 402). For comparison with the above CL data extraction, we requested information from the CL data coordinators regarding the total number of people seen by CL service at each site during the 10 day survey period (whether or not they were in the study sample). Information on numbers of new CL clients and the total number of episodes and occasions of service per annum were also requested from Drug and Alcohol Services Directors. These are reported in Table 4.2 below, where provided.

Table 4.2 Summary of CL services provided

Hospital	All new CL episodes during the 10 day survey period	Average number of new CL patients per annum	Average total number of CL episodes per annum	Average total occasions of service per annum
RPA	23	716	1033	1968
Campbelltown	13	422	552	955
Orange	2	Not provided	Not provided	Not provided
Albury	3	80	145	206
John Hunter	Not provided	936	1184	3964
Wollongong	7	405	1200	Not provided
Lismore	Not provided	Not provided	Not provided	Not provided
St Vincent's	Not provided	Not provided	Not provided	Not provided

Note: there can be multiple occasions of service within an episode

Based on these data, the low numbers of people in the Study 2 sample with CL data is a reasonable sample of CL patients, relative to the reported number of patients seen at each site during the 10 day survey period. The exception to this is RPA, where the CL sample is smaller than expected. On average CL services report seeing 512 new patients per annum, for a total of 823 episodes (implying that each client is seen 1.6 times per annum). In Study 1, 35% of people presenting to hospital screened positive for having a drug or alcohol problem. Based on the hospital level data collected in Study 2 part 1 (Table 3.1), the total number of presentations per hospital per annum ranges from approximately 25,000 to 60,000 depending on the hospital. If 35% of these have D&A problems then the proportion of people with D&A problems who are actually seen by the CL service is relatively small.

As shown in Table 4.1, 1138 Study 1 patients consented to NSW Health data linkage and had an MRN to enable CL data extraction. Of these 1138 people, 37 were excluded from the final sample for

Study 2. Patients were excluded because they had not completed the patient survey (n=31) or because their MRN was subsequently found to be invalid (n=6). For participants who consented to Medicare data extraction, MBS and/or PBS data were provided by Medicare Australia to the evaluation team at CHERE in February 2014. A summary of the Medicare data extraction for patients included in Study 2 is provided in Table 4.3.

Table 4.3 Medicare data extraction for Study 2 participants

Hospital	Patients included in Study 2	MBS consent	PBS consent	Both MBS and PBS consent[6]
RPA	172	121	91	91
Campbelltown	145	103	83	80
Orange	70	67	45	44
Albury	129	116	91	89
John Hunter	159	135	104	103
Wollongong	215	192	152	151
Lismore	76	73	65	65
St Vincent's	135	78	61	60
Totals	**1101**	**885**	**692**	**683**

4.2. Methods

Following a description of the Study 2 patient sample in section 4.3, the remainder of Section 4 is divided into subsections for each dataset examined. Within each dataset the analysis is presented in 3 parts. Part 1 compares outcomes for patients by level of D&A need based on the ASSIST tool used in the survey. Part 2 compares those patients who received a CL service at some time during the evaluation period (18 months prior to 12 months post the survey) with people who screened positive as requiring a brief or intensive intervention but who did not receive a CL service in order to investigate the type of patients seen by CL and determine an appropriate comparison group for the evaluation. Part 3 uses an interrupted time series regression analysis of key indicators to compare changes over time between the CL group and comparison group following the intervention in order to estimate the impact of receiving a D&A CL intervention. Below is an outline of the regression methods and a guide to interpreting the results of the regression analyses

[6] This is the subsample used in the total cost analysis presented in Section 4.8

Regression Methods

In our analysis of the individual patient data, we have estimated the impact of CL services using interrupted time series models.

We have identified four patient groups in the survey data:

- Those with no drug and alcohol problems, using the ASSIST criteria *(the base category in the analysis)*
- Those requiring a minimal intervention
- Those requiring an intensive intervention, but who did not receive CL *(the comparison group)*
- Those who did receive CL *(the CL group)*

The outcomes measured are the use of particular service types (e.g. hospital, ED). We control for other difference between the patient groups that might affect utilisation, described further below.

Some of the regression analyses are undertaken at a presentation or admission level (such as examination of length of stay) whilst others are undertaken at a patient level (such as the frequency of presentations per person per quarter). In presentation level analyses, the standard errors were corrected to account for multiple observations per patient. In the patient level analyses we used random effects modelling of outcomes per person per quarter to control for unobserved differences between individuals. [7]

In each regression model we controlled for patients' age, sex, country of birth and Indigenous status. We also controlled for individual hospitals where patients were surveyed to capture hospital level differences that may impact on outcomes. We mapped patients' postcodes to the Australian Bureau of Statistics (ABS) Socio Economic Index for Areas (SEIFA) to control for socio-economic differences between patients. The models also controlled for time (in quarters) and disaggregate patient groups by their ASSIST screen and CL status. Because the sample was selected in hospital, we control for the quarter in which the survey was conducted. This is because all patients in the sample were in hospital at the time of the survey and hence have a spike in presentations and admissions that quarter.

The models allow for changes in trends over time after the intervention, controlling for all of the factors described above. To enable us to consider differences in changes to trends over time between the CL group and the comparison group (i.e. the intensive need, no CL group) a proxy

[7] Random effects models assume that unobserved effects are uncorrelated with the observed variables in the model. This assumption was tested and a Mundlak correction was applied where required (i.e. including group means for time varying explanatory variables).

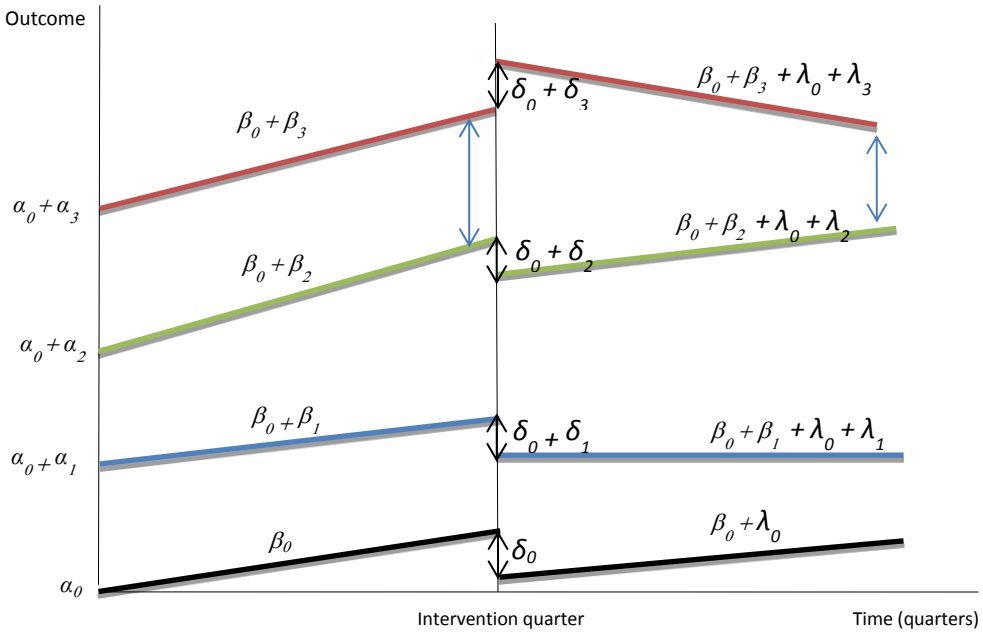
intervention time, based on the time after the survey, was constructed for patients who did not see CL during the observation period. This avoids assuming a constant time trend for the comparison group which may bias the results and is consistent with the time period when most initial CL visits occurred. Comparing differences in changes after the intervention for the CL group compared with the comparison group will provide an estimate of the effect of CL on each outcome.

How to interpret the regression output

Figure 4.2.1 below is a stylised representation of the regression output (after controlling for other differences between patients discussed above and controlling for the survey period).

- In our analysis we allow the baseline number of services (at the start of the observation period) to differ across each patient group. This is captured by the intercept on the graph for each group (α).
- We estimate the underlying time trend in the outcome of interest for all patients. We allow this time trend to differ across the different patient groups. This is captured by the slope on the graphs for each group (β).
- For the CL group, we model the time before and after the first CL visit. We refer to this as the intervention.
- We also allow for the possibility that there may be a change for the other patient groups. In effect, this is a proxy intervention, and allows for other changes, to avoid overestimating the effect of CL. The proxy intervention time is imposed at the time of the survey as this typically corresponds to the time of the first CL visit for the intervention group.
- We allow the outcome variable to change following the intervention (the shift in the intercept on the graphs for each group at the time of the intervention) (δ).
- We also allow the time trend to change following the intervention. This is captured by the change in the slope of the graph for each group following the intervention (λ).

Figure 4.2.1 Graphical representation of regression output



The diagram corresponds to the coefficients in the regression output as summarised in Table 4.4

Table 4.4 Sample regression output

	Base case	**Relative to base case**		
	No D&A problem	ASSIST brief, no CL	ASSIST intense, no CL (Comparison group)	Received CL (Intervention group)
Start of observation period	α_0	α_1	α_2	α_3
Time trend	β_0	β_1	β_2	β_3
Shift after the intervention period	δ_0	δ_1	δ_2	δ_3
Change in time trend after the intervention	λ_0	λ_1	λ_2	λ_3

To estimate the impact of the CL intervention at any quarter after the intervention period we compare the predicted difference in change in outcomes for the CL group compared to the comparison group with and without the intervention. Therefore, the effect of CL is captured by the estimating the net impact of the once-off shift at the time of the intervention for the CL group and the comparison group (the net change in the intercept), and the net impact of the change in the underlying time trend (the net change in the slope) for the CL group and the comparison group.

A detailed description of this is in Appendix 1, Section A.4.1.

4.3. Descriptive Statistics – patient comparisons

The descriptive statistics are based on the subsample of Study 1 participants included in Study 2.

Patient characteristics

The demographic characteristics of participants in Study 2, presented in Table 4.5, are consistent with those in the overall Study 1 sample, presented in Section 5 of this report, with the exception of Indigenous status. 5% of Study 1 participants were Aboriginal or Torres Strait Islanders, compared to 4% of the subsample included in Study 2.

Table 4.5 Demographic breakdown

Sex %		Aboriginal or TSI %			Country of birth %			Mean age (range)
Male	**Female**	**No**	**Yes**	**Unknown**	**Australia**	**Other**	**Unknown**	
52.86	47.14	95.37	4.18	0.45	79.11	20.16	0.73	41 (16-98)

Note: n=1101

Table 4.6 below summarises the proportion of the 1101 patients in Study 2 who screened positive for requiring brief or intensive intervention for drug and alcohol problems (excluding tobacco) based on the ASSIST screening tool used in the patient survey. The proportion of patients in this sample who screened positive (brief + intensive) is marginally higher than the 35% of the total sample who screened positive in Study 1.

Table 4.6 Intensity of intervention required

No Intervention	Brief Intervention	Intensive Intervention	Insufficient ASSIST information
61.67%	27.43%	8.81%	2.09%

Note: n=1101

Patients with CL referrals

A total of 39 patients had at least one CL referral during the 2.5 year (18 months pre to 12 months post survey) analysis period. CL services saw 23.71% of patients requiring intensive treatment (23 out of 97) and 3.31% of patients requiring only a brief intervention (10 out of 302), as summarised in Table 4.7 below. The results indicate that CL services are dealing with a subset of patients with D&A problems who are most in need of treatment.

Table 4.7 Proportion of patients at each level of intervention need referred to CL

	CL Referral during observation period	
Level of intervention required	**No**	**Yes**
ASSIST negative (n=679)	99.26%	0.74%
ASSIST positive: brief intervention (n=302)	96.69%	3.31%
ASSIST positive: intensive intervention (n=97)	76.29%	23.71%
Insufficient ASSIST information (n=23)	95.65%	4.35%

Note: n=1101; Rows sum to 100%

Comparisons were undertaken to investigate whether demographic characteristics of patients differ by D&A screen and CL referral status. The results for age, gender, Indigenous status and country of birth are summarised in Table 4.8 below.

Table 4.8 Demographic characteristics of patients by CL referral and ASSIST D&A screen status

Characteristic:	**Screened negative, no CL referral n=674**	**Screened positive: brief intervention, no CL referral n=292**	**Screened positive: intensive intervention, no CL referral n=74**	**All CL referred n=39**	**Significant difference across all categories p-value n=1079**
Mean age (range)	44 (16-98) (41.96-44.94)	37 (16-90) (35.48-39.35)	34 (17-79) (30.87-36.65)	39 (17-84) (34.64-42.80)	0.000
Gender, male%	48.37 (44.59-52.15)	57.88 (52.20-63.56)	66.22 (55.35-77.01)	64.10 (48.83-79.37)	0.001
Aboriginal or Torres Strait Islander, %	2.98 (1.69-4.26)	4.81 (2.34-7.28)	8.11 (1.81-14.38)	13.16 (2.25-24.06)	0.004
Australian born, %	78.40 (75.27-81.51)	80.41 (75.84-84.99)	82.43 73.69-91.17)	81.08 (68.27-93.89)	0.784

Note: total n=1079; 22 patients excluded with insufficient ASSIST/CL information. One patient with no ASSIST score was referred to CL and is included in the CL group. Calculations of % Indigenous and % Australian exclude those with missing values for these variables. 95% confidence intervals in parentheses.

Overall, demographic characteristics differ by D&A screen and CL status of patients, with the exception of country of birth. People with D&A problems (by ASSIST screen or CL referral) are younger, more likely to be male and more likely to be Aboriginal or Torres Strait Islander than those who screened negative. Pairwise tests reveal no significant differences in mean age, gender or country of birth for the CL referred group compared with either the brief or intensive need groups. People referred to CL are more likely to be Aboriginal or Torres Strait Islander than those with a brief intervention need (p=0.015). However, there is no significant difference in the proportion of Aboriginal people in the CL referred group compared to the intensive need group (p=0.205).

4.4. Analysis of presentations to ED

In Part 1 of this section, presentations to ED are compared by the patient's ASSIST screen status in the survey, to determine whether the impact on ED differs for patients with underlying D&A problems and by the intensity of intervention required. In Part 2, comparisons of presentations are made between people who screened positive but did not see CL (split by intensity of intervention required) and presentations for people who did see CL at some stage during the 2.5 year observation period (hereafter referred to as the CL group). This will provide an indication of the types of patients being seen by CL and the appropriate comparison group for the evaluation. Finally, in order to capture the impact of existing time trends and other patient characteristics on outcomes of interest, a series of regression analyses were undertaken and reported in Part 3, to investigate changes in outcomes for people who have a CL intervention compared with people in the comparison group.

Part 1: Comparisons of presentations to ED by ASSIST screen status

Patient characteristics

Of the 1101 participants included in Study 2, 1088 have at least one presentation to ED during the 2.5 year analysis period, from 18 months pre- to 12 months post-survey; 1065 of these also have an ASSIST screen score from the time of the survey, enabling comparisons by level of intervention need. Table 4.9 summarises ED presentations in the 2.5 year analysis period, by patient characteristics and ASSIST D&A screen status for these 1065 individuals.

Table 4.9 Presentations to ED by patient characteristics and ASSIST D&A screen status

Characteristic:	All presentations n=5692	Screened negative n=3184	Screened positive: brief intervention n=1595	Screened positive: intensive intervention n=913	Significant difference across categories p-value
Mean age; range	41 (16-98) (39-44)	44 (16-98) (40-47)	40 (16-90) (36-44)	37 (17-79) (34 - 40)	0.028
Gender, male%	46.24% (38.71-53.95)	36.24% (27.45-46.06)	55.92% (45.41-65.93)	64.18% (44.99-79.70)	0.005
Aboriginal or Torres Strait Islander %	7.75% (4.85-12.17)	5.37% (2.25-12.29)	9.54% (4.93-17.64)	12.92% (5.32-28.17)	0.272
Australian born %	85.14% (80.82-88.62)	82.81% (75.75-88.14)	86.54% (79.79-91.28)	90.80% (82.04-95.52)	0.235

Note: n=5692 presentations for 1065 individuals; excludes 13 individuals with zero presentations and excludes 76 presentations for 23 patients with insufficient information for ASSIST screening. Age is the age reported at the time of the patient survey. Calculations of % Indigenous and % Australian exclude those with missing values for these variables. 95% confidence intervals in parentheses.

Excluding the 23 people with insufficient ASSIST screen information, there were 5692 presentations for the 1078 people in the Study 2 sample (an average of 5.28 presentations per person). . Comparisons of the demographic breakdown by presentation in Table 4.9 with the demographic characteristics of the individuals in the sample presented in Table 4.5 gives an indication of relative frequency of presenting for different groups. 53% of the study 2 sample are male (Table 4.5) whereas 46% of presentations are for men, indicating that men present slightly less frequently than women. This gender difference is driven by people who screened negative; 48% of people in this group are male (see Table 4.8) but only 36% of presentations for people who screened negative are for men. 8% of presentations are for Aboriginal and Torres Strait Islander people although this group make up only 4% of the Study 2 sample, indicating that Aboriginal and Torres Strait islanders present twice as frequently as other patients. 84% of presentations are for people born in Australia compared to 79% of the sample indicating that the Australian born population present slightly more often than people born overseas.

Urgency

Triage categories represent the degree of urgency of ED presentations on a scale from 1 to 5, defined as follows:

1 Resuscitation
2 Emergency
3 Urgent
4 Semi-urgent
5 Non-urgent

(Source: NSW Health, Emergency Department Data Dictionary, Version 4, p.67)

Triage category of presentations of Study 2 participants during the 2.5 year analysis period are presented in Table 4.10 below. Differences in Triage Category by ASSIST screen status are not statistically significant (p-value for chi square test = 0.555).

Table 4.10 Triage category by ASSIST screening status

Triage Category	All presentations n=5692	Screened negative n=3184	Screened positive: brief intervention n=1595	Screened positive: intensive intervention n=913
Missing **%**	0.18 (0.10-0.32)	0.09 (0.03-0.29)	0.19 (0.06-0.59)	0.44 (0.19-1.02)
Cat. 1 **%**	0.37 (0.23-0.59)	0.25 (0.11-0.55)	0.31 (0.13-0.76)	0.88 (0.39-1.94)
Cat. 2 **%**	7.96 (6.13-10.28)	9.05 (6.20-13.01)	6.08 (4.43-8.30)	7.45 (4.35-12.48)
Cat. 3 **%**	34.08 (30.77-37.55)	34.14 (28.93-39.76)	34.48 (30.32-38.90)	33.19 (27.76-39.10)

Cat. 4 **%**	44.06 (40.62-47.56)	43.53 (38.06-49.16)	45.08 (40.74-49.49)	44.14 (38.67-49.75)
Cat. 5 **%**	13.35 (11.16-15.90)	12.94 (9.53-17.33)	13.86 (11.35-16.81)	13.91 (10.67-17.94)
Total **%**	100.00	100.00	100.00	100.00

Note: n=5692 presentations for 1065 individuals. 95% confidence intervals in parentheses.

Mode of arrival

Arrival mode of presentations of Study 2 participants by ASSIST screen status are presented in Table 4.11. Overall differences by ASSIST screen are significant at the 10% level but not at the 5% significance level (p=0.056). The estimates indicate that people who screened as needing an intensive intervention may be more likely to present via ambulance, public transport or police/correctional services vehicle.

Table 4.11 Mode of arrival of presentations by ASSIST D&A screen status

Mode of arrival	**All presentations n=5692**	**Screened negative n=3184**	**Screened positive: brief intervention n=1595**	**Screened positive: intensive intervention n=913**
NSW Ambulance Service **%**	37.93 (32.64-43.53)	35.84 (27.80-44.76)	35.3 (28.12-43.21)	49.84 (39.72-59.96)
Community/Public Transport **%**	4.43 (3.39-5.76)	3.39 (2.24,5.10)	4.70 (3.11-7.04)	7.56 (4.46-12.53)
Private Car **%**	52.46 (47.01-57.85)	56.6 (47.72,65.07)	55.17 (47.61-62.50)	33.3 (25.50-42.13)
Helicopter **%**	0.07 (0.02-0.24)	0.06 (0.02-0.26)	0.00	0.22 (0.03-1.59)
Air Ambulance **%**	0.07 (0.02-0.28)	0.13 (0.03-0.50)	0.00	0.00
Hosp. Transport/Int'l Ambulance **%**	0.25 (0.13-0.47)	0.28 (0.12-0.67)	0.25 (0.09,0.67)	0.11 (0.01-0.80)
Police/Correctional Svc. Vehicle **%**	2.16 (1.26-3.68)	1.85 (0.65-5.18)	2.01 (1.24-3.23)	3.50 (1.89-6.41)
Other **%**	0.35 (0.21-0.58)	0.22 (0.08-0.59)	0.19 (0.06-0.56)	1.10 (0.59-2.01)
Unknown or no transport **%**	2.20 (1.62-2.97)	1.54 (0.98-2.40)	2.32 (1.46-3.67)	4.27 (2.27-7.91)
Invalid Data **%**	0.09 (0.04-0.21)	0.09 (0.03-0.30)	0.06 (0.01-0.45)	0.11 (0.02-0.75)
Total %	100.00	100.00	100.00	100.00

Note: n=5692 presentations for 1065 individuals. 95% confidence intervals in parentheses.

Visit Type

There were no significant differences in visit type by ASSIST screen status (p=0.849), with 97% of visits being "emergency presentations".

Departure Status and Referrals on Departure

Overall differences in departure status from ED by ASSIST screen status are significant at the 10% level but are not quite significant at the 5% significance level (p=0.055). Comparisons indicate that people who screened as needing an intensive intervention may be more likely to leave at their own risk or not wait, compared to other patients.

Table 4.12 Departure status of presentations by ASSIST D&A screen status

Departure Status	All presentations n=5692	Screened negative n=3184	Screened positive: brief intervention n=1595	Screened positive: intensive intervention n=913
Missing **%**	0.09 (0.04-0.21)	0.09 (0.03-0.29)	0.06 (0.01-0.45)	0.11 (0.02-0.79)
Admitted to ward / inpatient unit **%**	20.61 (18.47-22.92)	19.72 (16.81-23.00)	22.82 (19.10-27.02)	19.82 (15.89-24.45)
Admitted & discharged as inpatient **%**	5.83 (4.80-7.08)	6.00 (4.56-7.86)	5.27 (3.96-6.97)	6.24 (3.73-10.27)
Departed; Treatment completed **%**	54.73 (51.50-57.91)	56.69 (51.89-61.36)	54.42 (49.46-59.29)	48.41 (41.95-54.92)
Departed; Transferred to another hospital **%**	0.49 (0.28-0.87)	0.53 (0.23-1.22)	0.38 (0.13-1.12)	0.55 (0.25,1.20)
Departed; Did not wait **%**	7.99 (6.75-9.44)	7.13 (5.46-9.27)	7.52 (5.76-9.77)	11.83 (8.72-15.85)
Departed; Left at own risk **%**	4.11 (3.28-5.14)	3.83 (2.70-5.41)	3.26 (2.32-4.55)	6.57 (4.46-9.58)
Dead on Arrival **%**	0.09 (0.04-0.21)	0.00	0.06 (0.01-0.44)	0.44 (0.16-1.21)
Departed; for other Clinical Service **%**	1.07 (0.79-1.45)	1.07 (0.72-1.58)	0.94 (0.47-1.86)	1.31 (0.68,2.51)
Admitted; To Critical Care Ward **%**	2.74 (2.01-3.73)	2.98 (1.99-4.45)	3.13 (1.82-5.34)	1.20 (0.57-2.51)
Admitted; Via Operating Suite **%**	0.28 (0.16-0.48)	0.16 (0.06-0.39)	0.50 (0.25-1.01)	0.33 (0.08-1.39)
Admitted; Transferred to another hospital **%**	1.41 (0.95-2.08)	1.29 (0.66-2.49)	1.13 (0.61-2.08)	2.30 (1.41-3.74)
Admitted; Left at own risk **%**	0.56 (0.34-0.93)	0.50 (0.22-1.16)	0.50 (0.21-1.17)	0.88 (0.40-1.91)
Total %	100	100	100	100

Note: n=5692 presentations for 1065 individuals. 95% confidence intervals in parentheses.

We also examined referrals on departure but found no significant differences by ASSIST screen status (p=0.615). We repeated the analysis of referrals on departure for a subset of hospitals with CL services operating with extended hours and/or after hours on-call.[8] However, the differences in referrals on departure by ASSIST status remained insignificant for this subset of hospitals (p=0.596)

Finally, we compared total referrals between the hospitals with extended hours and other hospitals and found significant differences between hospitals (p=0.000). We also ran this separately for patients with and without D&A problems and obtained similar results, suggesting that the difference in referral patterns reflects overall differences between hospitals, not limited to the hours of operation of the D&A CL service. The results for all patients are presented in Table 4.13 below. Hospitals with extended hours report fewer referrals to specialists and more "other" referrals which includes admissions.

Table 4.13 Departure status of presentations by hospitals with and without extended CL hours

Referred to on departure	Hospitals with extended CL hours	Other hospitals	All hospitals
Missing **%**	0.17 (0.04-0.70)	4.86 (2.92-7.99)	3.13 (1.76-5.50)
Review in ED, Scheduled **%**	0.84 ([0.42-1.68)	2.16 (1.36-3.43)	1.67 (1.07-2.60)
Review in ED, as required **%**	1.26 (0.78,2.03)	0.64 (0.36-1.14)	0.87 (0.59-1.28)
Community Health **%**	0.5 (0.17-1.52)	0.59 (0.31-1.13)	0.56 (0.32-0.97)
Home Nursing **%**	0	0.15 (0.04-0.53)	0.09 (0.02-0.36)
LMO Specialist **%**	44.13 (35.35-53.29)	46.44 (40.52-52.46)	45.58 (39.69-51.60)
Outpatients Clinic **%**	3.02 (2.05-4.42)	1.28 (0.86-1.90)	1.92 (1.48-2.49)
Other (incl. admissions) **%**	35.57 (28.79-42.98)	22.01 (16.89-28.16)	27.02 (21.84-32.92)
Not referred **%**	9.98 (7.11-13.84)	4.42 (3.21-6.07)	6.48 (4.70-8.86)
Not known **%**	1.68 (1.06-2.65)	8.55 (6.80-10.70)	6.01 (4.81-7.49)
Specialist **%**	1.01 (0.54-1.88)	8.5 (6.53-10.99)	5.73 (4.48-7.31)
Mental Health, Alcohol and other drugs - inpatient facility **%**	0	0.2 (0.07-0.53)	0.12 (0.05-0.33)
Mental Health, Alcohol and other drugs non-inpatient facility **%**	0.5 (0.15-1.73)	0.05 (0.01-0.32)	0.22 (0.06-0.82)

[8] Based on information provided in Table 1 of the Draft Model of Care Report. This included presentations at John Hunter, RPA, Concord, Liverpool Hospital and Campbelltown hospitals.

Invalid Data **%**	1.34 (0.48-3.73)	0.15 (0.02-1.04)	0.59 (0.21-1.61)
Total %	100	100	100

Note: As per discussion with John Agland, NSW Health, Mental Health departure codes were introduced in July 2010 during the course of our evaluation period and should be interpreted cautiously. These referrals were previously included in community health and other referrals. 95% confidence intervals in parentheses.

Frequency and costs of presentations

2009/10 NSW Costs of Care Standards provide cost weights to enable costing of presentations depending on urgency (triage category) and disposition group (subsequently admitted, ED only, and did not wait). NSW ED cost weights are summarised in Table 4.14 below:

Table 4.14 Emergency department cost weights by disposition and triage

Urgency and Disposition Group (UDG)	Cost weight
Subsequently Admitted Triage 1	2.96
Subsequently Admitted Triage 2	1.78
Subsequently Admitted Triage 3	1.53
Subsequently Admitted Triage 4	1.33
Subsequently Admitted Triage 5	0.91
ED Only Triage 1	1.62
ED Only Triage 2	1.24
ED Only Triage 3	1.08
ED Only Triage 4	0.81
ED Only Triage 5	0.50
Did not wait	0.18

(Source: NSW Health (2011), p.15)

ED costs were calculated by multiplying the relevant cost weight for each presentation by the 2009/10 average cost of $396 per ED presentation (NSW Health (2011) NSW Costs of Care Standards 2009-2010, p.15), inflated to 2012 prices using the AIHW price index for "government final consumption expenditure on hospitals and nursing homes" (AIHW, 2013). The mean number and cost of presentations per Study 2 participant per quarter, by ASSIST screen status, is presented in Table 4.15.

Table 4.15 Average cost of presentations per patient per quarter by ASSIST D&A screen status

	Mean number of presentations	Mean cost of presentations ($)
Overall (n=10,780)	0.53 (0.45-0.61)	210.56 (180.17-240.95)
ASSIST negative (n=6790)	0.47 (0.36-0.58)	188.00 (146.61-229.39)

ASSIST positive: brief intervention (n=3020)	0.53 (0.43-0.62)	211.73 (172.21- 251.24)
ASSIST positive: intensive intervention (n=970)	0.94 (0.63-1.25)	364.83 (246.83-482.84)

Notes: n=10,780 represents 10 quarters of observations for 1078 individuals. Excludes 23 individuals with missing ASSIST information; Sample includes 13 individuals with zero presentations. 95% confidence intervals in parentheses.

Overall, the number of presentations per person per quarter differs significantly by ASSIST screen status (p=0.020). People identified in the survey as requiring an intensive intervention present twice as often as those who screened negative for D&A problems (p value of pairwise comparison = 0.005). The mean costs of presentations per person per quarter also differ significantly by ASSIST screen status (p=0.021), with people requiring an intensive intervention at the time of the survey, costing an additional $177 per quarter than those without D&A problems (p=0.006).

Waiting times

NSW Health ED Key Performance Indicators (KPIs) include benchmarks for triage waiting times and for waiting time in ED for patients who are subsequently admitted. Performance against these benchmarks was compared for presentations of patients by D&A screening status.

Triage performance

Triage performance is defined as the percentage of patients whose treatment waiting time is within the benchmark for their triage category. Benchmarks for each category are as follows:

Triage Cat.1 (resuscitation) = % treated within 2 minutes

Triage Cat.2 (emergency) = % treated within 10 minutes

Triage Cat.3 (urgent) = % treated within 30 minutes

Triage Cat.4 (semi-urgent) = % treated within 60 minutes

Triage Cat.5 (non-urgent) = % treated within 120 minutes

(Source: Demand and Performance Evaluation Branch, 2010)

Overall, 39% of presentations in our sample are seen within the benchmark time, with no significant variation by ASSIST screen status (p=0.449). This is inconsistent with State-wide triage performance of 76% of NSW public hospital ED presentations in 2011-12 seen on time (AIHW, 2012). This is probably a sample selection issue because people who waited longer in ED may have been more likely to complete the survey. Consequently the focus for this indicator in our study should be on differences rather than absolute estimates. We also disaggregated the results by triage category.

The proportion of presentations in our sample seen within the benchmark time for each triage category and by ASSIST screen status is summarised in Table 4.16 below.

Table 4.16 Percentage of presentations seen within the benchmark waiting time for each triage category by ASSIST status

Triage Category	All presentations	Screened negative	Screened positive: brief intervention	Screened positive: intensive intervention	p-value of chi square test
Cat. 1 %	85.71 (62.25-95.62)	75.00 (32.39-94.95)	100.00	87.50 (48.69-98.10)	0.428
Cat. 2 %	46.36 (41.92-50.85)	43.40 (38.44-48.50)	45.36 (36.56-54.47)	60.29 (47.41-71.89)	0.037
Cat. 3 %	33.30 (30.66-36.04)	32.38 (28.68-36.32)	34.73 (30.12-39.64)	33.99 (29.13-39.22)	0.677
Cat. 4 %	37.44 (34.08-40.92)	36.36 (31.53-41.49)	40.06 (34.67-45.69)	36.48 (31.21-42.09)	0.512
Cat. 5 %	53.03 (46.03-59.91)	51.94 (40.69-63.00)	53.85 (46.59-60.94)	55.12 (42.80-66.84)	0.890
All categories combined	39.00 (36.43-41.63)	37.76 (34.08,41.58)	40.64 (36.53-44.89)	40.48 (36.11,45.01)	0.449

Note: n=5682 presentations for 1065 individuals (10 presentations with missing triage category excluded)

95% confidence intervals in parentheses.

The only significant difference in triage performance by ASSIST screen status is for triage category 2 (p=0.037). Presentations in this "emergency" triage category are more likely to be seen within the benchmark time for people who screened in the survey as requiring an intensive D&A intervention.

We also examined overall time in ED (from triage to departure) but found no significant difference by ASSIST screen status.

Emergency admission performance

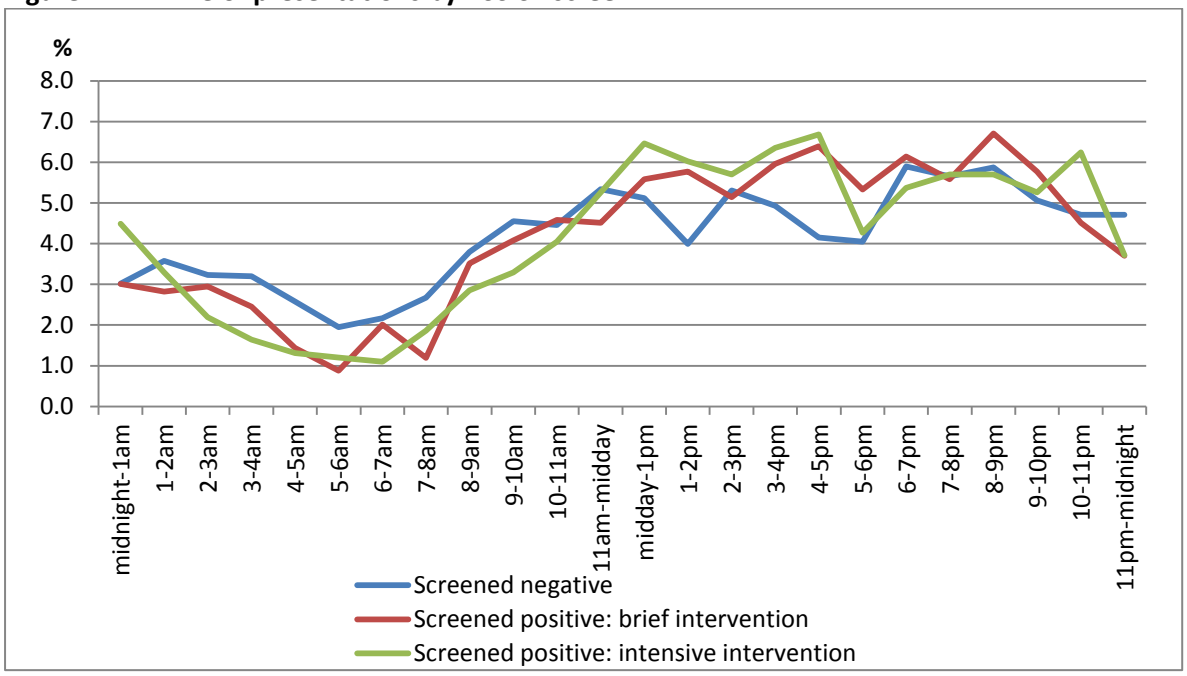
Overall 71% of ED presentations were admitted from ED for inpatient care. The proportion of presentations admitted did not vary significantly according to ASSIST screening status (p=0.530). Emergency Admission Performance (EAP) is defined as the percentage of ED patients who were admitted for acute inpatient care and whose admission was within 8 hours, or within 4 hours, of their arrival in the ED (from triage time). EAP did not vary significantly by ASSIST screening status (p=0.442 and p=0.909 for 8 and 4 hour thresholds respectively).

Day and time of presentations by ASSIST screen status

CL services do not operate around the clock, and some services are not available on weekends, although hospitals have CL referral systems in place. Consequently, we examined the time of day and day of the week of presentations to identify patterns that may provide insights for allocation of D&A CL services.

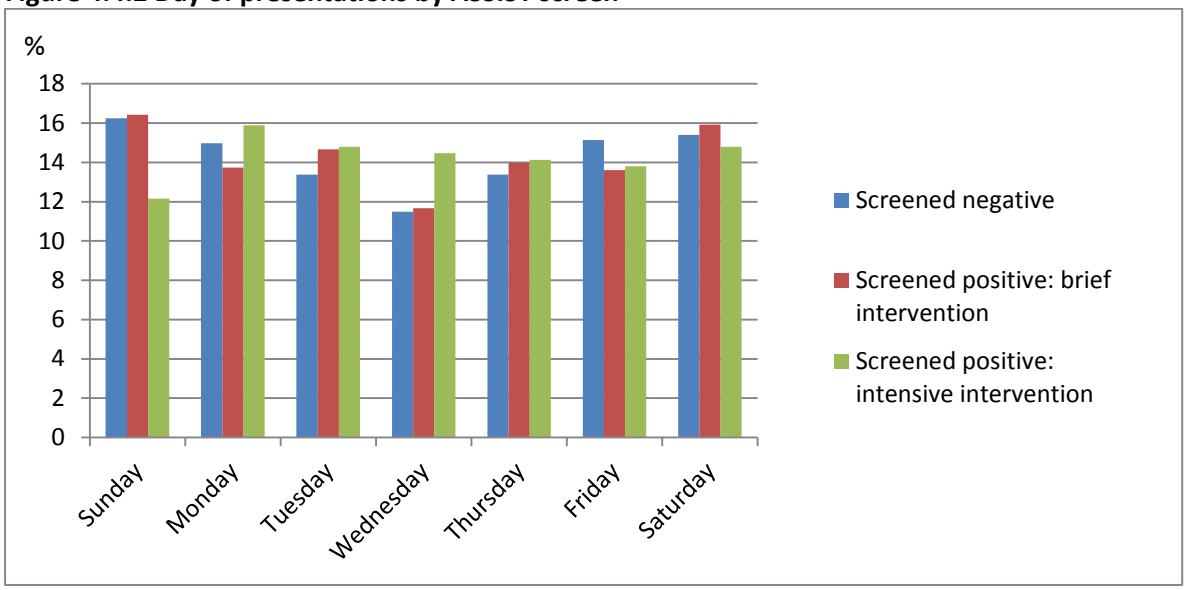
Patients present to ED at all hours of the day and night, with the fewest presentations in the hours after midnight and more presentations occurring in the afternoon/evening than at other times of day. Differences by ASSIST screen status were significant at the 10% level but not at the 5% level (p=0.08). Peak presentation time for patients who screened negative for D&A problems is between 6pm and 9pm. Patients who screened in the survey as requiring an intensive intervention were more likely to present either in the afternoon or slightly later in the evening.

Figure 4.4.1 Time of presentations by ASSIST screen



Day of the week of presentations did not differ significantly by ASSIST screen status (p=0.16).

Figure 4.4.2 Day of presentations by ASSIST screen



Summary of descriptive statistics Part 1: differences in presentations by ASSIST screen

The descriptive comparisons indicate that the type of presentations differ for people who screened as needing an intensive intervention. This group is more likely to arrive by ambulance, public transport or police/correctional services vehicle and is more likely to present in the afternoon or slightly later in the evening than other patients. The evidence also suggests that people who screened as needing an intensive intervention are more likely to leave at their own risk or not to wait, compared to presentations for other patients. People identified as requiring an intensive intervention present twice as often as those who screened negative for D&A problems with an associated ED cost of $177 more per quarter than those without D&A problems.

Part 2: Comparisons of presentations for patients who received CL and those who screened positive in Study 1 but did not see CL during the observation period.

In Part 2 we restrict our analysis to people identified as having a D&A problem, either according to the ASSIST screen tool in the patient survey, or because they were referred to CL at some point in the 2.5 year period of the evaluation. Presentations for people in the CL group are compared with these for people screened as requiring an intervention but who were not referred to CL during the 2.5 year observation period. This will provide an indication of the suitable comparison group for the regression analyses that follow in part 3.

Patient characteristics

Of the 405 participants in Study 2 who were identified as having a D&A problem, 402 had at least one presentation to ED during the 2.5 year analysis period, from 18 months pre- to 12 months post-survey. Table 4.17 summarises ED presentations in the 2.5 year analysis period, by patient characteristics and ASSIST D&A screen and CL status for these 402 individuals. No statistically significant differences were detected.

Table 4.17 Presentations by patient characteristics; patients with D&A problems by ASSIST screen and CL status

Characteristic:	Screened positive: brief intervention (no CL) n=1454	Screened positive: intensive intervention (no CL) n=629	CL group n=458	Significant difference across categories p-value
Mean age; range	39; 16 – 90 (35 – 43)	37; 17 – 79 (34 - 41)	40; 17 – 84 (34 – 45)	0.714
Gender, male%	55.02 (44.02-65.55)	65.98 (41.66-84.04)	59.83 (37.97-78.37)	0.656
Aboriginal or Torres Strait Islander %	9.64 (4.80-18.42)	12.24 (4.21-30.67)	12.56 (3.59-35.60)	0.896
Australian born %	87.05 (80.39-91.68)	90.94 (79.30-96.34)	87.58 (70.88-95.34)	0.775

Notes: Total n=2541 = presentations for 402 patients with D&A problems. Excludes 3 people who had zero presentations (all in the brief intervention need group). Age is the age reported at the time of the patient survey. % Indigenous and % Australian born exclude persons missing these survey responses. 95% confidence intervals in parentheses.

Urgency

Triage category of presentations during the 2.5 year analysis period for Study 2 participants with D&A problems, are presented in Table 4.18. Differences in Triage Category by ASSIST screen and CL status are not statistically significant (p-value for chi square test = 0.703).

Table 4.18 Triage category of presentation for patients with D&A problems, by ASSIST screen and CL status

Triage Category	Screened positive: brief intervention (no CL) n=1454	Screened positive: intensive intervention (no CL) n=629	CL group n=458
Missing **%**	0.21 (0.07-0.65)	0.32 (0.10-1.02)	0.44 (0.12-1.59)
Cat. 1 **%**	0.28 (0.10-0.75)	0.48 (0.15-1.48)	1.31 (0.51-3.32)
Cat. 2 **%**	5.98 (4.24-8.38)	7.47 (3.62-14.79)	6.77 (4.02-11.19)
Cat. 3 **%**	33.43 (29.10-38.04)	31.96 (25.57-39.09)	37.99 (29.51-47.27)
Cat. 4 **%**	45.80 (41.14-50.54)	45.79 (39.22-52.51)	40.83 (33.50-48.59)
Cat. 5 **%**	14.31 (11.64-17.46)	13.99 (10.22-18.86)	12.66 (8.33-18.79)
Total **%**	100.00	100.00	100.00

Notes: 95% confidence intervals in parentheses.

Mode of arrival

Arrival mode of presentations of Study 2 participants with D&A problems are presented in Table 4.19. Differences by ASSIST screen and CL status are not statistically significant (p=0.115). However, the estimates indicate that compared to people screened as requiring a brief intervention people who screened as needing an intensive intervention and those referred to CL during the observation period are be more likely to arrive by ambulance or police/correctional services vehicle.

Table 4.19 Mode of arrival of presentations for patients with D&A problems, by ASSIST D&A screen status

Mode of arrival	Screened positive: brief intervention (no CL) n=1454	Screened positive: intensive intervention (no CL) n=629	CL group n=458
NSW Ambulance Service %	32.12 (24.85-40.37)	50.08 (37.14-63.01)	52.40 (39.32-65.16)
Community/Public Transport %	5.16 (3.42-7.71)	5.88 (3.25-10.42)	7.64 (3.38-16.35)
Private Car %	58.25	35.61	30.13

	(50.22-65.87)	(24.48-48.55)	(22.23-39.42)
Helicopter %	0.00	0.32 (0.04-2.36)	0.00
Hospital Transport/Int'l Ambulance %	0.21 (0.07-0.65)	0.16 (0.02-1.18)	0.22 (0.03-1.52)
Police/Correctional Services Vehicle %	1.51 (0.86-2.65)	4.13 (2.04-8.18)	3.49 (1.79-6.70)
Other %	0.21 (0.07-0.61)	0.79 (0.32-1.93)	1.09 (0.46-2.57)
Unknown or no transport %	2.54 (1.60-4.01)	3.02 (1.50-6.00)	4.59 (1.76-11.44)
Invalid Data %	0.00	0.00	0.44 (0.11-1.66)
Total %	100.00	100.00	100.00

Notes: 95% confidence intervals in parentheses.

Visit Type

There were no significant differences in visit type by ASSIST screen and CL status (p=0.728), with 97% of visits being "emergency presentations", consistent with the overall Study 2 sample.

Departure Status and Referrals on Departure

Overall differences in departure status from ED for patients with D&A problems by ASSIST screen and CL status are statistically significant (p=0.014). In particular, compared to people who screened as requiring a brief intervention, people in the CL group and those identified as needing an intensive intervention are more likely to depart without waiting or at their own risk.

Table 4.20 Departure status of presentations for patients with D&A problems, by ASSIST D&A screen and CL status

Departure Status	**Screened positive: brief intervention (no CL) n=1454**	**Screened positive: intensive intervention (no CL) n=629**	**CL group n=458**
Missing %	0.07 (0.01,0.49)	0.00	0.22 (0.03,1.57)
Admitted to ward / inpatient unit %	22.90 (18.90,27.46)	17.01 (12.25,23.14)	24.45 (19.47,30.23)
Admitted & discharged as inpatient %	4.61 (3.42,6.18)	8.11 (4.82,13.32)	5.46 (2.96,9.87)
Departed; Treatment completed %	55.85 (50.46,61.10)	51.67 (42.26,60.97)	42.14 (35.32,49.27)
Departed; Transferred to another	0.41	0.48	0.44

hospital %	(0.14,1.22)	(0.18,1.23)	(0.11,1.73)
Departed; Did not wait %	7.08	10.97	12.66
	(5.39,9.26)	(7.49,15.79)	(7.94,19.61)
Departed; Left at own risk %	2.96	6.20	6.77
	(2.09,4.17)	(3.82,9.92)	(3.89,11.52)
Dead on Arrival (%)	0.07	0.16	0.66
	(0.01,0.48)	(0.02,1.16)	(0.20,2.10)
Departed; for other Clinical Service %	1.03	1.11	1.09
	(0.52,2.04)	(0.47,2.59)	(0.37,3.21)
Admitted; To Critical Care Ward %	2.96	0.64	3.28
	(1.61,5.39)	(0.18,2.23)	(1.67,6.32)
Admitted; Via Operating Suite %	0.55	0.48	0.00
	(0.27,1.12)	(0.11,2.03)	
Admitted; Transferred to another hospital %	0.96	2.38	2.18
	(0.55,1.69)	(1.38,4.10)	(0.82,5.66)
Admitted; Left at own risk %	0.55	0.79	0.66
	(0.24,1.28)	(0.26,2.38)	(0.23,1.88)
Total %	100	100	100

Notes: 95% confidence intervals in parentheses.

We also examined referrals on departure but found no significant differences between patients with D&A problems by ASSIST screen and CL status (p=0.455). We repeated the analysis of referrals on departure for a subset of hospitals with CL services operating with extended hours and/or after-hours on-call.[9] However, the differences in referrals on departure by ASSIST screen and CL status remained insignificant for this subset of hospitals (p=0.569). As noted in Part 1, overall referral patterns differ in hospitals with and without extended CL hours.

Finally, we considered whether, for the CL group, referrals on departure differed for presentations associated with a CL visit compared to other presentations for the same patients. The results indicate no statistically significant differences between referrals for presentations associated with a CL visit and other presentations for the same group of patients.

Frequency and costs of presentations

The mean number and cost of presentations per Study 2 participant per quarter, by ASSIST screen status, is presented in Table 4.21.

[9] Based on information provided in Table 1 of the Draft Model of Care Report. This included presentations at John Hunter, RPA, Concord, Liverpool Hospital and Campbelltown hospitals.

Table 4.21 Average cost of presentations per patient per quarter, by ASSIST D&A screen and CL status

	Mean number of presentations	Mean cost of presentations ($)
Screened positive: brief intervention; no CL	0.50	198.83
	(0.40 – 0.59)	(159.51 – 238.16)
Screened positive: intensive intervention; no CL	0.85	321.06
	(0.48 – 1.22)	(177.58 – 464.53)
CL group	1.17	480.91
	(0.82 – 1.53)	(353.14 – 608.67)

Notes: n=4050 representing 10 quarters of observations for 405 individuals; Sample includes 13 individuals with zero presentations. 95% confidence intervals in parentheses.

Overall, the number of presentations per person per quarter differs significantly by ASSIST screen and CL status (p=0.000). For patients who did not see CL during the 2.5 year observation period, pairwise comparisons indicate significant differences between people requiring an intensive intervention compared to those requiring a brief intervention at the 10% significance level but not at the 5% level (p=0.074). People in the CL group present significantly more frequently than those requiring a brief intervention (not referred to CL) (p=0.000). There is no significant difference in average frequency of presentations between the group of patients who saw CL during the observation period, and those requiring an intensive intervention who did not see CL (p=0.216).

The mean cost of presentations per person per quarter also differs significantly by ASSIST screen and CL status (p=0.000). For those who did not see CL, ED costs for people requiring an intensive intervention do not differ significantly from those requiring a brief intervention. However people who were referred to CL during the 2.5 year observation period have significantly higher ED costs than the group requiring a brief intervention (p=0.000).

Waiting times

NSW Health ED Key Performance Indicators (KPIs) include benchmarks for triage waiting times and for waiting time in ED for patients who are subsequently admitted. Performance against these benchmarks was compared for presentations of patients by D&A screening status.

Triage performance

Overall, 41% of presentations for people with D&A problems in our sample are seen within the benchmark time, with no significant variation by ASSIST screen and CL status (p=0.659). We also disaggregated the results by triage category. The proportion of presentations exceeding the

benchmark time for each triage category is summarised in Table 4.22 below. There are no statistically significant differences in triage performance by ASSIST screen and CL status of patients.

Table 4.22 Percentage of presentations for patients with D&A problems seen within the benchmark waiting time for each triage category by ASSIST and CL status

Triage Category	Screened positive: brief intervention (no CL) n=1451	Screened positive: intensive intervention (no CL) n=627	CL group n=456	p-value of chi square test
Cat. 1	100.00	100.00	83.33 (39.01-97.50)	0.479
Cat. 2	43.68 (34.18-53.66)	61.70 (51.97-70.58)	58.06 (32.60-79.86)	0.163
Cat. 3	34.77 (29.74-40.17)	35.32 (28.32-43.02)	32.18 (26.73-38.17)	0.786
Cat. 4	40.54 (34.79-46.56)	39.58 (33.72-45.76)	33.69 (25.50-42.99)	0.412
Cat. 5	54.33 (46.74-61.72)	53.41 (38.45-67.78)	55.17 (39.58-69.81)	0.985
All categories combined	40.94 (36.46-45.57)	42.11 (36.57-47.85)	38.16 (32.61-44.03)	0.659

Note: Total n=2534 presentations for 402 individuals (presentations with missing triage information excluded). 95% confidence intervals in parentheses.

We also examined overall time in ED for people with D&A problems (from triage to departure) but found no significant difference by ASSIST screen and CL status.

Emergency admission performance

Overall 70% of ED presentations for people with D&A problems were admitted from ED for inpatient care, which is similar to the rate of admission of the total Study 2 sample. The proportion of presentations admitted did not vary significantly according to ASSIST screening and CL status of patients (p=0.396). We also considered whether, for the CL group, the proportion of ED presentations subsequently admitted differed for presentations during which the person received a CL consultation compared to other presentations for the same patients. We found that 73% of presentations associated with a CL visit resulted in admission, compared with 30% of other presentations for the same group of patients (p=0.000).

Emergency Admission Performance (EAP) is defined as the percentage of ED patients who were admitted for acute inpatient care and whose admission was within 8 hours, or within 4 hours, of their arrival in the ED (from triage time). Overall 49% of admitted presentations for people with D&A problems exceeded the 8 hour threshold and 81% exceeded the 4 hour threshold, which are

very similar to the results for all patients presented in Part 1. EAP did not vary significantly by ASSIST screen and CL status of patients (p = 0.965 and p = 0.245 for 8 and 4 hour thresholds respectively).

We also considered whether, for the group of people who received CL during the observation period, EAP differed for presentations associated with a CL visit compared to other presentations for the same patients. The results indicate that presentations during which the patient received CL are significantly more likely to exceed the 8 hour EAP threshold (p=0.02). This may indicate that patients who need to be seen by the CL service are consequently retained longer in ED or it may indicate that more complicated presentations, which stay longer in ED, are more likely to receive a CL referral. The results are presented in

Table 4.23 below:

Table 4.23 Eight hour EAP of admitted presentations for the CL group

Admitted within 8 hours	Presentations not associated with CL visit	Presentations during which a CL visit occurred	Total
No (%)	44.62	68.18	48.03
Yes (%)	55.38	31.82	51.97

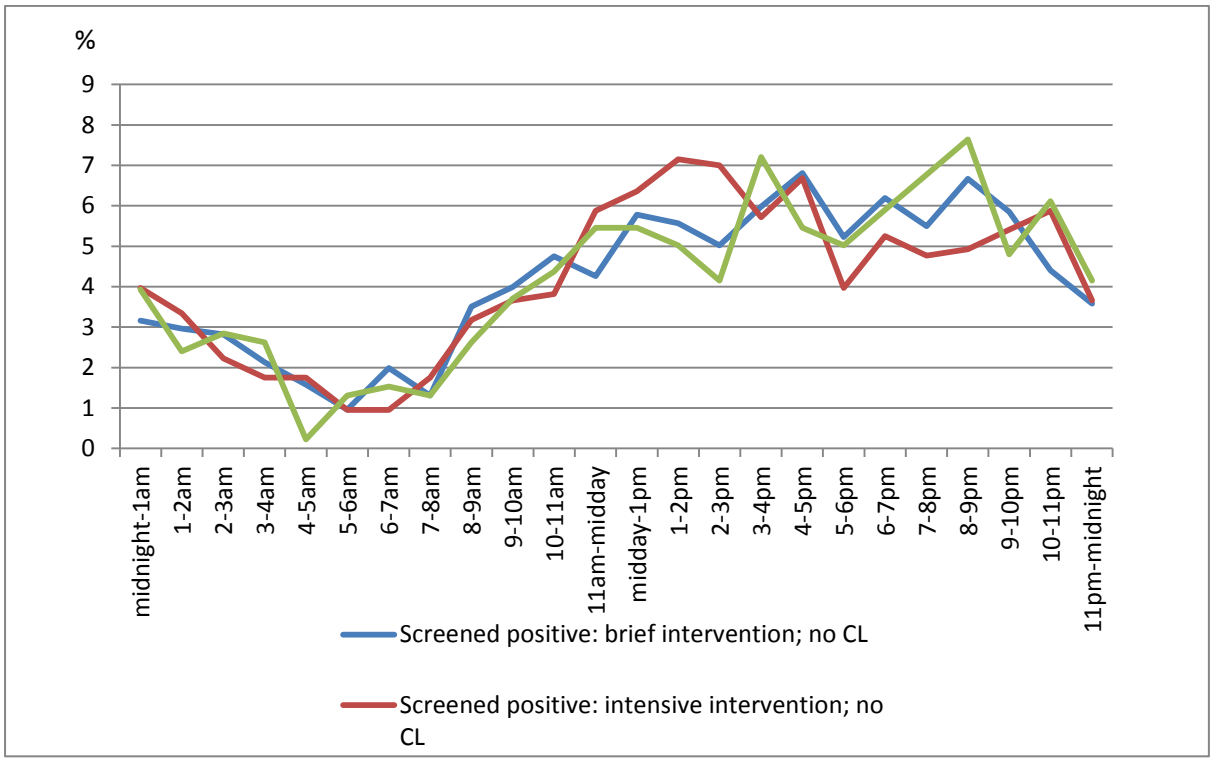
Note: n=152 presentations admitted from ED for 36 individuals with a CL consultation during the evaluation period.

Day and time of presentations for patients with D&A problems by ASSIST screen and CL status

As noted in Part 1, CL services do not operate around the clock, and some services are not available on weekends, although hospitals have CL referral systems in place. Consequently, we examined the time of day and day of the week of presentations to identify patterns that may provide insights for allocation of D&A CL services.

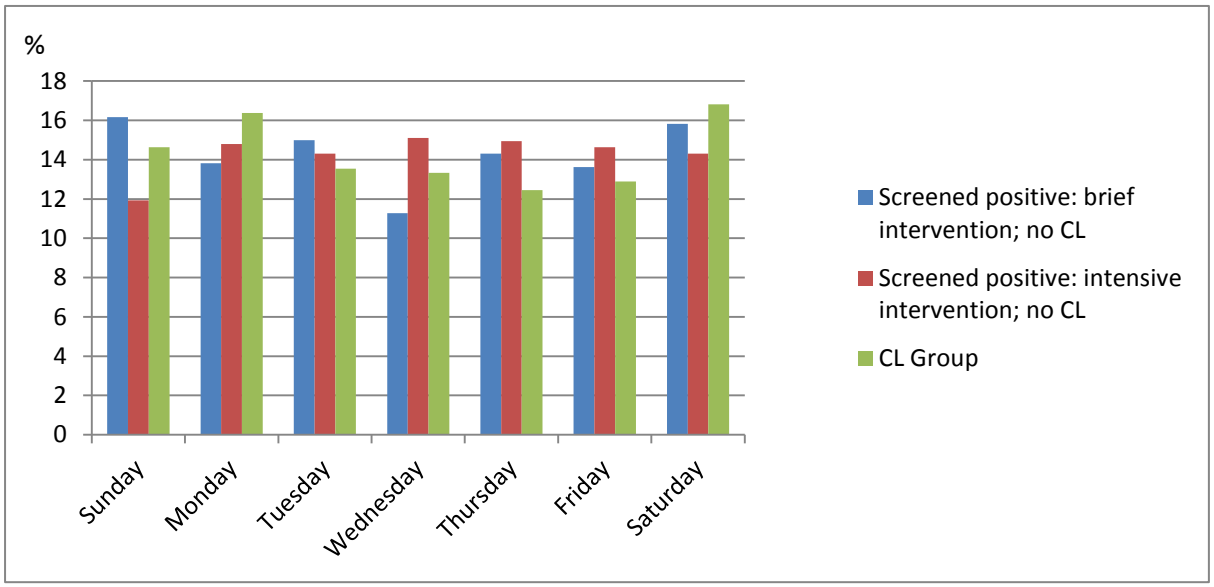
Patients with D&A problems present to ED at all hours of the day and night, with the fewest presentations in the hours after midnight and more presentations in the afternoon/evening than at other times of day. Differences by ASSIST screen and CL status were not statistically significant (p=0.854). However, peak presentation time for patients who were referred to CL at some time during the 2.5 year analysis period is later in the evening (8-9pm) than for people who screened as requiring an intensive intervention but who did not see CL.

Figure 4.4.3 Time of presentations by ASSIST screen and CL status of patients



Within the D&A group, differences in the day of the week of presentations are also not significant (p=0.426). However people who were referred to CL during the 2.5 year evaluation period presented more often on Saturday, Sunday and Monday than on other days of the week.

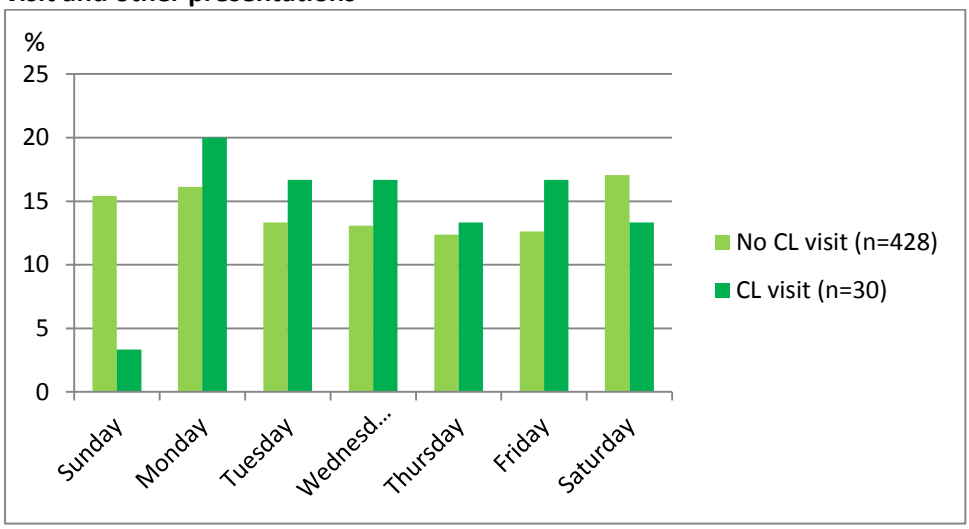
Figure 4.4.4 Day of presentations by ASSIST screen and CL status of patients



We also separately considered the day of the week of presentations for the CL group, split by presentations during which the person saw CL and other presentations for the same people. Although the differences were not significant (p=0.614), the pattern suggests that presentations that

receive a CL consultation are less likely to have arrived on a Sunday. Of the 30 presentations that received a CL consultation during their time in ED, 24 of these occurred in hospitals with extended hours.

Figure 4.4.5 Day of presentations for the CL patient group, by presentations associated with a CL visit and other presentations



Summary of descriptive statistics Part 2: differences in presentations by ASSIST screen and CL status of patients

The evidence presented in Part 2 indicates that patients who received CL at some stage during the 2.5 year observation period are similar to those who screened as requiring an intensive intervention but were not seen by CL. Both of these patient groups are more likely to depart without waiting and present more frequently than people who screened as requiring only a brief intervention. This suggests that the intensive need (no CL) group are an appropriate comparison group for the evaluation. However, the CL group appears to be more costly than those requiring an intensive intervention but who did not see CL during the observation period. The regression analyses that follow will therefore take a difference-in-difference approach, by controlling for baseline differences between patient groups.

Part 3: Regression analyses

In this section we move beyond descriptive comparisons to investigate whether there are significant differences in ED outcomes between patients with D&A problems and those without, and changes after the initial observed CL visit, when potentially confounding factors are controlled for. We undertook regression analyses of length of stay in ED per presentation, the probability of being admitted from ED per presentation, admission performance per presentation and numbers and costs of presentations per person. The descriptive statistics demonstrated that presentations associated with a CL visit stay longer in ED; therefore, in the presentation level analyses, we control for whether the presentation was at the time of the 1st CL visit, which may artificially inflate the trend over time up to the intervention if not controlled for. Further details of the methods and how to interpret the reported results can be found in Section 4.2

Length of stay in ED

Ordinary least squares (OLS) regression analysis was used to estimate time in hours from triage to departure per presentation. In addition to the controls discussed previously, we included triage category and whether the patient was subsequently admitted, as these factors are expected to impact on waiting time. The coefficients in Table 4.24 represent the marginal effect in hours of each variable, after controlling for other differences.

Table 4.24 OLS regression results: length of stay in ED (hours)

	Base case	Relative to base case		
Variable	**No D&A problem**	**ASSIST brief, no CL**	**ASSIST intense, no CL**	**Received CL**
Start of the observation period	-	0.73	1.08	0.49
Time trend	0.23***	-0.17	-0.39	-0.13
Shift after the intervention period	0.18	-1.93**	-2.12	-0.01
Change in time trend after intervention period	-0.55**	1.15***	1.90**	0.80

Notes: Results are reported as coefficients. n=5681. Standard errors corrected for multiple observations per person. Controls for patient and hospital characteristics, survey time and 1st CL visit, triage category and admission status.
****, **, * = significant at 1%, 5% and 10% levels respectively.*

At the start of the 2.5 year observation period there are no significant differences in average length of stay (LOS) in ED per presentation for patients with D&A problems compared to those without. The LOS in ED per presentation increases at a rate of 0.23 hours (14 minutes) per quarter. This trend does not differ significantly for patients with D&A problems compared to those without. Following the intervention period, a significant downward shift in LOS per presentation is observed for people

identified as needing a brief intervention (no CL) but not for other patient groups. There is also a significant decrease in the trend in LOS per presentation of 0.55 hours per quarter for the no D&A group following the intervention period. In contrast there is an increase in the trend over time for the brief and intensive need groups. Following the intervention period, for patients in the comparison group (those who screened as needing an intensive intervention who did not see CL) the average length of stay per presentation increases by 1.9 hours every quarter relative to the no D&A group, on average. However, for the group who saw CL, the post-intervention change in trend is not significantly different from patients without D&A problems. This suggests that CL may prevent an increase in average LOS in ED over time.

Admitted from ED

Logistic regression analysis was used to estimate the probability of a presentation to ED being subsequently admitted to hospital. The results are presented as odds ratios (the odds of being admitted relative to not being admitted).

Table 4.25 Logistic regression analysis of admission from ED

	Base case	Relative to base case		
Variable	**No D&A problem**	**ASSIST brief, no CL**	**ASSIST intense, no CL**	**Received CL**
Start of the observation period	-	1.02	0.68	0.63
Time trend	1.02	1.04	1.12	1.12
Shift after the intervention period	0.44***	4.08***	1.48	2.09
Change in time trend after intervention period	1.21	0.56***	0.57*	0.75

Notes: Results are reported as odds ratios. n=5696. Standard errors corrected for multiple observations per person. Controls for patient and hospital characteristics, survey time and 1st CL visit, triage category and admission status.
****, **, * = significant at 1%, 5% and 10% levels respectively.*

At the start of the observation period there is no significant difference in the odds of being admitted for patients with D&A problems compared to those without, nor is there any significant trend over time (for any patient group). Following the intervention period, there is an immediate decrease in the odds of being admitted for the non D&A group; this decrease does not differ significantly for the CL or intensive intervention need patient groups. In contrast, for the brief intervention need group there is actually an initial increase in the odds of admission following the intervention period followed by a decreasing trend over time. There is a similar decrease in trend over time for the

intensive intervention need group but this is not significant at the 5% level (p=0.062). Overall there is little evidence of any impact of CL on the odds of admission following the intervention.

Emergency Admission Performance

Regression models for emergency admission performance (EAP) predict the odds of being admitted within the 8 hour and 4 hour EAP benchmarks, per presentation. The analysis was restricted to presentations that resulted in admission to hospital. The models were run using logistic regression analysis which is appropriate for binary data (admitted within benchmark time: yes versus no). Control variables are included as previously described. The results for the coefficients of interest, which are reported as odds ratios for ease of interpretation, are presented in Table 4.26 and Table 4.27. The odds ratios represent the odds of being admitted within the EAP benchmark versus the odds of exceeding the benchmark, for each characteristic. For example, an odds ratio of 2 would mean that the odds of being admitted within the benchmark are twice as high as the odds of exceeding the benchmark. An odds ratio of one indicates that a unit increase in the characteristic (or change from no to yes for a binary variable) has no independent effect on EAP.

Table 4.26 Logistic regression analysis of 4 hour EAP

	Base case	Relative to base case		
Variable	**No D&A problem**	**ASSIST brief, no CL**	**ASSIST intense, no CL**	**Received CL**
Start of the observation period	-	0.84	0.53	1.56
Time trend	1.02	0.94	1.23	0.84
Shift after the intervention period	0.82	4.63*	7.04	0.70
Change in time trend after intervention period	1.17	0.55	0.16***	0.97

Notes: Results are reported as odds ratios. n=1668. Standard errors corrected for multiple observations per person. Controls for patient and hospital characteristics and survey time. Time of 1st CL visit and unknown Indigenous status perfectly predicted failure – 12 observations omitted.
****, **, * = significant at 1%, 5% and 10% levels respectively.*

There is no evidence of a significant difference in 4 hour EAP prior to the intervention for patients with D&A problems and those without. Following the intervention period there is a significant decrease over time in the odds of being admitted within the 4 hour benchmark for the intensive intervention need group. However this is not observed for the CL group. This suggests that CL may prevent a worsening in 4 hour EAP for presentations following the intervention.

Table 4.27 Logistic regression analysis of 8 hour EAP

	Base case	Relative to base case		
Variable	**No D&A problem**	**ASSIST brief, no CL**	**ASSIST intense, no CL**	**Received CL**
Start of the observation period	-	0.44**	0.57	1.65
Time trend	0.94	1.18	1.10	0.90
Shift after the intervention period	0.99	1.40	7.24**	0.90
Change in time trend after intervention period	1.24	0.50**	0.35***	0.82

Notes: Results are reported as odds ratios. n=1680. Standard errors corrected for multiple observations per person. Controls for patient and hospital characteristics, and survey time and 1st CL visit.
****, **, * = significant at 1%, 5% and 10% levels respectively.*

At the start of the observation period, the odds of being admitted within the 8 hour EAP benchmark are significantly lower for people who screened as needing a brief intervention, compared to patients without D&A problems. However, there is no significant difference at baseline between patients in the intensive need or CL groups relative to the no D&A group. There is no significant time trend in EAP prior to the intervention period for any patient group. Following the intervention period there is a decrease in trend over time in 8 hour EAP for the brief intervention need group. For the intensive need group, following the intervention period, the odds of presentations being admitted within 8 hours initially increase but this is followed by a decrease in the trend over time. This is not evident in the CL group, indicating that CL may prevent a worsening in EAP over time.

Number of presentations

The regression analysis of predicted number of presentations was undertaken at a patient level, predicting the average number of presentations per person per quarter over the 2.5 year analysis period. We use random effects modelling to examine changes over time as well as differences between individuals. Because the outcome variable is a count, we use a negative binomial regression technique which is appropriate for analysing over dispersed[10] count data. The results are reported as incident rate ratios (IRRs) in Table 4.28 for ease of interpretation. Incident rate ratios (IRRs) indicate the marginal effect of each variable on the number of presentations. An IRR greater than one indicates an increase in the number of presentations, an IRR of less than one indicates a decrease.

[10] Over dispersion: variance>mean

Table 4.28 Random effects, negative binomial regression of presentations per quarter per person

	Base case	Relative to base case		
Variable	**No D&A problem**	**ASSIST brief, no CL**	**ASSIST intense, no CL**	**Received CL**
Start of the observation period	-	1.14	2.08***	1.32
Time trend	1.17***	1.06	0.99	1.14**
Shift after the intervention period	0.43***	1.52	1.42	2.20***
Change in time trend after intervention period	0.91	0.72***	0.86	0.71***

Notes: Results are reported as incident rate ratios. n=10790, represents 10 quarters of observations for 1079 individuals. Controls for patient and hospital characteristics, survey time and group means for time varying explanatory variables.
****, **, * = significant at 1%, 5% and 10% levels respectively.*

At the start of the observation period, relative to people without D&A problems, people who screened as needing an intensive intervention had twice as many presentations, on average. The brief need and CL patient groups did not differ significantly from the no D&A group, at baseline. The number of presentations over time initially increases at a rate of 17% per quarter for the no D&A group (IRR = 1.17) and this trend does not differ significantly for people screened as needing either a brief or intensive intervention (who did not see CL). For the CL group, the initial trend in presentations over time is 14% higher (IRR = 1.14) than the trend for the no D&A group. Following the intervention period, there is a downward shift of 57% in the average number of presentations for the group with no D&A problems (1-0.43). The size of this shift does not differ significantly for patients needing either a brief or intensive intervention who did not see CL. However, for the CL group the size of the initial decrease in presentations post intervention is significantly smaller at an estimated 5% (IRR = 2.20 x 0.43 = 0.95 – i.e. size of decrease = 5%). Over time, however, people who received a CL consultation have 39% fewer presentations per quarter (1-0.71), which is similar to the brief intervention need group. In contrast, those requiring an intensive intervention but who did not see CL do not have a significant change in the trend in presentations over time. This suggests that whilst the impact of CL on frequency of presentations may not be felt immediately, over time the rate of presentations decreases for people who received CL relative to the comparison group.

Cost of presentations

The regression analysis of predicted cost of presentations was undertaken at a patient level, predicting the average cost of presentations per quarter over the 2.5 year analysis period. We use random effects OLS models to examine changes over time as well as differences between individuals. The coefficients represent the marginal effect of each characteristic on ED costs per quarter.

Table 4.29 Random effects regression of cost of ED presentations per quarter per person

	Base case	Relative to base case		
Variable	**No D&A problem**	**ASSIST brief, no CL**	**ASSIST intense, no CL**	**Received CL**
Start of the observation period	-	11.10	79.89	-160.30
Time trend	20.25***	8.54	16.18	98.21***
Shift after the intervention period	-92.51***	39.88	127.10	78.86
Change in time trend after intervention period	-23.23**	-41.56*	-86.31**	-172.35***

Notes: Results are reported as the coefficient. n=10790, represents 10 quarters of observations for 1079 individuals. Controls for patient and hospital characteristics, survey time and group means for time varying explanatory variables.
****, **, * = significant at 1%, 5% and 10% levels respectively.*

There are no significant differences between patient groups at the start of the observation period. There is a significant increasing time trend in ED costs of $20.25 per quarter for people without D&A problems and this does not differ significantly for people who screened as having a need for either a brief or intensive intervention but who did not see CL. For the group who received CL during the observation period, the initial time trend is $98.21 per quarter higher, on average. Following the intervention period there is an initial decrease in costs per quarter of $92.51, which does not differ significantly by patient group. Following the intervention period, there is also a decrease in the trend over time of $23.23 per quarter for patients without D&A problems. This decrease in the trend in ED costs over time is significantly greater for the group identified as needing an intensive intervention but who did not see CL, and greater still for the CL group. The difference in the decrease in trend in costs post-intervention for the CL group relative to the control group is $86.04 (172.35-86.31) per quarter. The estimated cumulative effect of this cost difference between patients who received CL and the comparison group is $860.40 in the first year following the intervention.[11] The estimated shift in costs after the intervention period is also less for the CL group than the comparison group. However, as these estimates are not significantly different from the base case we have not included this possible additional cost saving for CL vs the comparison group in our calculation. The estimate of $860.40 cost savings is therefore conservative.

Summary and Conclusions

The regression results indicate that CL services may prevent an increase in average LOS in ED over time and prevent a worsening in EAP in subsequent presentations. There is also evidence of a

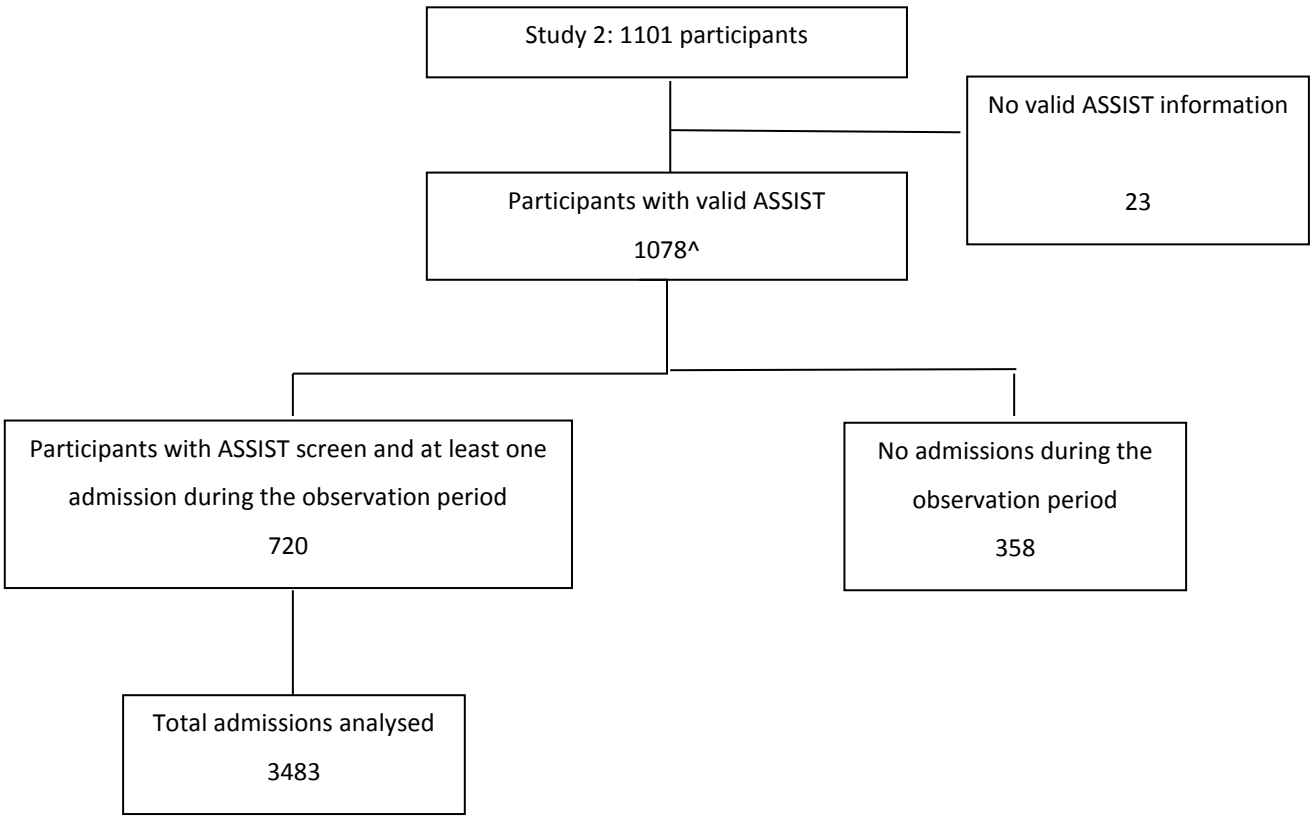
[11] (86.04 in the 1st quarter + 2 x 86.04 in the 2nd quarter + 3 x 86.04 in the 3rd quarter + 4 x 86.04 in the 4th quarter)

delayed impact of CL on frequency of presentations, which eventually decrease for people who received CL relative to the comparison group. The estimated ED cost savings for patients who received CL relative to the control group is $860.40 in the first year following the intervention.

4.5. Analysis of inpatient admissions

In this section we conduct an analysis of all inpatient admissions that occurred during the 2.5 year analysis period, from 18 months pre- to 12 months post-survey. This includes all admitted patient episodes (AP) provided by New South Wales Public Hospitals, Public Psychiatric Hospitals, Public Multi-Purpose Services, Private Hospitals, and Private Day Procedures Centres. The structure of this analysis is similar to that of presentations to ED. In Part 1 of this section, admissions are compared by the patient's ASSIST screen status in the survey. In Part 2, comparisons of admissions are made between people who screened positive but did not see CL (split by intensity of intervention required) and admissions for those for people who did see CL during the 2.5 year observation period. In Part 3, a series of regression analyses are undertaken to capture the impact of existing time trends and other patient characteristics on outcomes of interest, and to investigate changes in outcomes for people who have a CL intervention compared with people in the comparison group.

Participant flow



^ Part 3 of the analyses includes 1079 participants, including one participant without valid ASSIST information but saw CL during the observation period.

Part 1: Comparisons of admissions by ASSIST screen status

Of the 1101 participants included in Study 2, 23 patients were excluded as they did not have a valid ASSIST screen score from the time of survey. Of the remaining 1,078 participants, 358 participants had no admissions during the observation period, leaving 720 individuals with admissions available for analysis. Table 4.30 summarises AP presentations in the 2.5 year analysis period, by patient characteristics and ASSIST D&A screen status for these 720 individuals. The total number of admissions during the analysis period for these individuals was 3483.

Patient characteristics

Table 4.30 Admissions by patient characteristics and ASSIST D&A screen status

Characteristic:	All admissions n=3483	Screened negative n=2141	Screened positive: brief intervention n=966	Screened positive: intensive intervention n=376	Significant difference across categories p-value
Mean age (range)	50 (16-92) (47-53)	53 (16-92) (49-57)	48 (16-90) (42-53)	39 (18-73) (36-42)	0.000
Gender, male%	48.49 (39.24-57.85)	42.08 (30.54-54.57)	57.97 (43.93-70.83)	60.64 (40.80-77.49)	0.107
Aboriginal or Torres Strait Islander %	5.55 (3.27-9.26)	3.09 (1.29-7.22)	6.22 (2.70-13.67)	17.82 (6.94-38.66)	0.008
Australian born %	83.39 (77.18-88.17)	80.96 (71.45-87.84)	88.23 (79.49-93.55)	84.84 (68.11-93.62)	0.379

Note: n=3483 admissions for 720 individuals; excludes 367 individuals with zero admissions and excludes 75 admissions for 14 patients with insufficient information for ASSIST screening. Age is the age reported at the time of the patient survey. Calculations of % Indigenous and % Australian exclude those with missing values for these variables. 95% confidence intervals in parentheses.

There were 3483 admissions for the 720 individuals that had a valid ASSIST score and an admission during the analysis period (an average of 4.84 admissions per person). Comparisons of the demographic breakdown by admission in Table 4.9 with the demographic characteristics of the individuals in the sample presented in Table 4.5 gives an indication of relative frequency of admission for different groups. The mean age of the study sample is 41 (Table 4.5) whereas the mean age of admissions is 50 years, indicating that older people tend to get admitted more often. The mean age of admissions for those who screened as requiring an intensive intervention was 39 years, significantly younger than the mean age of those screened negative (53 years, p =0.00). 5.55% of presentations are for Aboriginal and Torres Strait Islander people although this group make up 4% of the Study 2 sample, indicating that Aboriginal and Torres Strait islanders are admitted more frequently than other patients.

Utilisation of psychiatric wards and intensive care units

Table 4.31 Proportion of admissions that spent time in a psychiatric ward or intensive care unit, by ASSIST screen status

Characteristic:	All admissions n=3483	Screened negative n=2141	Screened positive: brief intervention n=966	Screened positive: intensive intervention n=376	Significant difference across categories p-value
Admitted to psychiatric ward	10.82 (7.59-15.21)	7.38 (3.86-13.64)	12.63 (6.78-22.31)	25.80 (16.06-38.71)	0.009
Admitted to intensive care unit	2.15 (1.52-3.04)	2.24 (1.38-3.63)	2.17 (1.30-3.63)	1.60 (0.73-3.45)	0.789

Note: n=3483 admissions for 720 individuals. 95% confidence intervals in parentheses.

Table 4.31 summarises the proportion of admissions that spent time in a psychiatric ward or intensive care unit (ICU), by ASSIST screen. Overall, approximately 11% of admissions spent time in a psychiatric ward. Compared to those who screened negative a significantly higher proportion of admissions where patients had a positive screen status requiring an intensive intervention (p=0.003) spent time in a psychiatric ward. Of all admissions, only 2.15% of admissions spent time in an ICU. This did not vary significantly by ASSIST screen status.

Length of stay

Table 4.32 Admissions characteristics by ASSIST screen status

Characteristic:	All admissions n=3483	Screened negative n=2141	Screened positive: brief intervention n=966	Screened positive: intensive intervention n=376	Significant difference across categories p-value
Length of stay (days)	4.08 (3.49-4.66)	3.57 (2.78-4.36)	4.54 (3.80-5.28)	5.78 (4.42-7.15)	0.017
Length of stay in a psychiatric ward (days)	1.02 (0.56-1.48)	0.64 (0.03-1.25)	1.22 (0.51-1.94)	2.66 (1.31-4.01)	0.025
Mean duration in an intensive care unit	1.19 (0.68-1.69)	1.05 (0.41-1.69)	1.08 (0.53-1.67)	2.17 (-0.38-4.73)	0.705

Note: n=3483 admissions for 720 individuals. 95% confidence intervals in parentheses.

The mean length of stay for all admissions was 4.08 days. Admissions for those with a positive screen status, requiring an intensive intervention had a significantly longer mean length of stay compared to those with a negative screen status (p=0.01). It should be noted that the mean days spent in a psychiatric ward includes those patients who did not spend any time in a psychiatric ward. Therefore the difference in length of stay can be partly explained by the higher proportion of admissions in this

group spending time in a psychiatric ward (Table 4.31) and partly explained by a longer length of stay amongst those admissions that were admitted to a psychiatric ward (8.6 days in the screen negative group and 10.3 days in the intensive intervention group) (Table 4.31). The average time spent in ICU for all admissions was 1.19 hours. This did not vary significantly by screen status.

Referrals after separation

Table 4.33 Referrals on departure by ASSIST screen status

Referred to on departure:	All admissions n=3483	Screened negative n=2141	Screened positive: brief intervention n=966	Screened positive: intensive intervention n=376
Outpatients %	3.30	2.57	3.93	5.85
Private psychiatric practice%	0.09	0.09	0.10	0.00
Community treatment order %	0.20	0.19	0.10	0.53
Community health %	1.00	1.17	0.41	1.60
District nursing %	7.87	6.45	8.80	13.56
Private medical practitioner %	44.65	47.13	43.27	34.04
Palliative care %	0.06	0.00	0.10	0.27
Group home %	0.23	0.09	0.21	1.06
Other %	13.29	12.38	12.11	21.54
Not referred %	7.06	6.91	6.42	9.57
Not Known %	22.25	23.03	24.53	11.97

Note: n=3483 admissions for 720 individuals

As shown in Table 4.33, the majority of admissions were referred to a private medical practitioner after separation (44.65%). This did not vary significantly by ASSIST status

Unit Type on Admission

When examining the unit type upon admission, only 9 admissions were admitted into psychiatric emergency beds. This did not vary significantly by ASSIST status.

Frequency and costs of admissions by ASSIST screen status

2009/10 NSW Costs of Care Standards (NSW Cost of Care Standards 2009-2010: Appendix 1) provide costs per AR-DRG (Version 5) to enable calculation of average costs per admission. The AR-DRGs of all admissions were matched with the appropriate AR-DRG from the NSW Cost of Care Standards.

The average cost presented in the NSW Cost of Care Standards for that AR-DRG was then used to calculate the cost of all admissions. Separate costs were applied for overnight admissions and same-day admissions, where applicable. The costs were then applied to each individual to calculate an average cost per patient. Finally costs were inflated to 2012 dollars using inflation rates derived from the AIHW price index for hospitals and nursing homes (AIHW, 2013). Patients who were not admitted during the analysis window have a cost of zero. The results are summarised in Table 4.34 below.

Table 4.34 Average cost of admissions per quarter per person by ASSIST D&A screen status

ASSIST screen status	Mean number of admissions	Mean cost of admissions ($)
Overall (n=10,780)	0.32 (0.26-0.38)	1,538.90 (1,243.38-1,834.41)
ASSIST negative (n=6,790)	0.32 (0.23-0.40)	1,392.50 (1,140.28-1,644.72)
ASSIST positive: brief intervention (n=3,020)	0.32 (0.23-0.41)	1,810.65 (944.70-2,676.60)
ASSIST positive: intensive intervention (n=970)	0.39 (0.26-0.51)	1,717.56 (1,098.09-2,337.04)

Notes: n=10,780 represents 10 quarters of observations for 1078 individuals. Excludes 23 individuals with missing ASSIST information; Sample includes 358 individuals with zero admissions. 95% confidence intervals in parentheses.

The mean number of admissions per person per quarter for the overall sample is 0.32 and the mean cost of admissions per person per quarter is $1,538.90. The number of admissions and the mean cost of admissions do not differ significantly by ASSIST status.

Summary of descriptive statistics – admissions by ASSIST status

The descriptive comparisons indicate that admissions for people who screened as needing an intensive intervention are more likely to be admitted to a psychiatric ward during their stay. Furthermore, once admitted into a psychiatric ward they have a longer length of stay in the ward.

The evidence also suggests that admissions for people who screened as needing an intensive intervention may have a longer total length of stay compared to those who screened negative. The mean cost of admissions per person per quarter did not differ significantly by ASSIST status.

Part 2: Comparisons of admissions for patients who were referred to CL and those who screened positive in Study 1 but did not see CL during the observation period

Of the 1101 participants included in Study 2, 720 have at least one admission during the 2.5 year analysis period and a valid ASSIST score. Of these 720 participants, 37 saw the CL service at least once during the analysis period. A further 189 participants had an ASSIST positive screen, requiring a brief intervention and 44 participants screened ASSIST positive requiring an intensive intervention, but did not see CL during the period. Table 4.35 summarises AP admissions by patient characteristics amongst those that had an ASSIST screen positive score and those that saw CL. The total number of admissions during the analysis period for these individuals was 1355.

Patient characteristics

Table 4.35 Admissions by patient characteristics and ASSIST and CL status

Characteristic:	Screened positive: brief intervention, no CL n=884	Screened positive: intensive intervention, no CL n=253	CL group n=218	Significant difference across categories p-value
Mean age (range)	47 (16-90) (41-54)	39 (18-79) (35-43)	42 (17-84) (35-49)	0.073
Gender, male% :	57.47 (42.52-71.16)	56.92 (31.49-79.15)	66.51 (45.07-82.79)	0.794
Aboriginal or Torres Strait Islander %	6.00 (2.42-14.12)	19.37 (5.88-48.03)	13.02 (4.17-34.00)	0.189
Australian born %	87.63 (78.06-93.38)	87.35 (62.95-96.56)	85.38 (67.23-94.32)	0.959

Note: n=1355 admissions for 270 individuals that had a positive ASSIST screening status and had at least one admission during the analysis period. Age is the age reported at the time of the patient survey. Calculations of % Indigenous and % Australian exclude those with missing values for these variables. 95% confidence intervals in parentheses.

Utilisation of psychiatric wards and intensive care units

Table 4.36 Proportion of admissions that spent time in a psychiatric ward or intensive care unit, by ASSIST and CL status

Characteristic:	Screened positive: brief intervention, no CL n=884	Screened positive: intensive intervention, no CL n=253	CL group n=218	Significant difference across categories p-value
Admitted to psychiatric ward	11.99 (5.97-22.63)	26.48 (14.01-44.33)	22.94 (13.03-37.16)	0.103
Admitted to intensive care unit	1.81 (1.03-3.15)	1.19 (0.38-3.60)	3.67 (1.53-8.56)	0.198

Note: n=1355 admissions for 270 individuals that had a positive ASSIST screening status and had at least one admission during the analysis period. 95% confidence intervals in parentheses.

Overall, the proportion of admissions that involved time in a psychiatric ward was greater amongst those that screened positive requiring an intensive intervention or those that received a CL service compared to those that screened positive requiring a brief intervention, although these differences were not significant. The proportion of admissions that spent time in ICU was similar across categories. There were no significant differences between those that received a CL service during the intervention period and those that screened positive, requiring an intensive intervention, but did not see CL.

Length of stay

Table 4.37 Admissions characteristics by ASSIST and CL status

Characteristic:	Screened positive: brief intervention, no CL n=884	Screened positive: intensive intervention, no CL n=253	CL group n=218	Significant difference across categories p-value
Length of stay (days)	4.25 (3.58-4.91)	5.68 (3.87-7.49)	7.06 (5.00-9.11))	0.020
Length of stay in a psychiatric ward (days)	1.04 (0.41-1.67)	2.43 (0.71-4.16)	3.43 (1.09-5.77)	0.066
Mean duration in an intensive care unit (hours)	0.95 (0.39-1.52)	1.20 (-0.94-3.35)	3.34 (-0.25-6.94)	0.430

Note: n=1355 admissions for 270 individuals that had a positive ASSIST screening status and had at least one admission during the analysis period. 95% confidence intervals in parentheses.

Admissions for those who received a CL service had a longer mean length of stay compared to those who screened ASSIST positive, requiring a brief or intensive intervention, although pairwise comparisons indicated that only the difference between the CL group and brief intervention group was significant (p=0.011). Similarly, admissions for those that saw CL spent more time in a psychiatric ward and in ICU than admissions for those who screened ASSIST positive, requiring a brief or intensive intervention. However, post-hoc pair-wise comparisons showed that none of these differences were significant at the 5% level.

Additional analyses were conducted comparing total length of stay, length of stay in a psychiatric ward and mean duration in an intensive care unit for those admissions that occurred at the same time as a CL visit to admissions for people who saw CL at some time during the analysis period, but not during that admission. There were no significant differences between the two groups. Results are available from CHERE upon request.

Referrals after separation

Table 4.38 Referrals on departure by ASSIST and CL status

Referred to on departure:	Screened positive: brief intervention, no CL n=884	Screened positive: intensive intervention, no CL N=253	CL group n=218
Outpatients %	4.30	4.35	5.50
Private psychiatric practice%	0.11	0.00	0.00
Community treatment order %	0.11	0.40	0.92
Community health %	0.34	1.19	1.83
District nursing %	8.60	12.25	13.30
Private medical practitioner %	43.21	36.36	35.32
Palliative care %	0.11	0.40	0.00
Group home %	0.23	1.58	0.00
Other %	11.20	22.13	20.64
Not referred %	6.67	8.30	9.17
Not Known %	25.11	13.05	13.30

Note: n=1355 admissions for 270 individuals that had a positive ASSIST screening status and had at least one admission during the analysis period.

Where patients were referred to upon departure was similar across categories. There were no significant differences between those that received a CL service during the intervention period and those that screened positive, requiring an intensive intervention, but did not see CL.

Additional analyses were conducted comparing referrals upon departure for those admissions that occurred at the same time as a CL visit to admissions for people who saw CL at some time during the analysis period, but not during that admission. There were no significant differences between the two groups. Results are available from CHERE upon request.

Unit Type on Admission

Of those admissions where the patients screened ASSIST positive or received a CL service only 4 admissions were admitted into psychiatric emergency beds. None of these admissions were for patients who had received CL.

Frequency and costs of admissions by ASSIST screen status

On average patients that saw a CL service had more admissions per quarter than those participants that had a positive ASSIST screen (brief, p=0.008 or intensive, p=0.064) but did not see CL. The mean cost of admissions was calculated using the methodology described in Part 1 of this Section. Participants that saw CL had a higher mean cost of admissions per quarter than those participants that had a positive ASSIST screen (brief or intensive) but did not see CL, although differences were not significant. The results are summarised in Table 4.39 below.

Table 4.39 Average cost of admissions per quarter per patient by ASSIST and CL status

ASSIST screen status	Mean number of admissions	Mean cost of admissions ($)
Screened positive: brief intervention, no CL (n=292)	0.30 (0.21-0.39)	1,750.93 (857.11-2,644.76)
Screened positive: intensive intervention, no CL (n=74)	0.34 (0.18-0.50)	1,543.46 (796.41-2,290.51)
CL group* (n=39)	0.56 (0.39-0.73)	2,405.88 (1,531.41-3,280.36)

Notes: n=4050, represents 10 quarters of observations for 405 individuals that screened ASSIST positive or saw the CL service. Sample includes individuals with zero admissions (2 individuals saw the CL service but had no admissions). 95% confidence intervals in parentheses.
**Patient referred to CL at some point in the 2.5 year observation period.*

Summary of descriptive statistics – admissions by ASSIST and CL status

The descriptive comparisons indicate that the CL group were more likely than those that did not receive CL to be admitted to ICU, although the difference was not statistically significant. The CL group also had a longer mean length of stay and spent longer on average in a psychiatric ward and ICU than those that did not receive CL. However, the only significant difference was for average length of stay, for the CL group compared to the brief intervention need (no CL) group (p=0.011).

On average patients that saw a CL service had more admissions per quarter and a higher mean cost of admissions than those participants that had a positive ASSIST screen (brief or intensive) but did not see CL. The only significant difference was for frequency of admissions, for the CL group compared to the brief intervention need (no CL) group (p=0.008).

No significant differences were detected between the CL and intensive intervention need (no CL) groups.

Part 3: Regression analyses

In this section we move beyond descriptive comparisons to investigate whether there are significant differences in admitted patient outcomes between patients with D&A problems and those without, and changes after the initial observed CL visit, when potentially confounding factors are controlled for. We undertook regression analyses of the number of admissions per individual, overall length of stay, length of stay in a psychiatric ward and number of hours spent in ICU. In admission level analyses, the standard errors were corrected for to account for multiple observations per patient. In the patient level analyses we used random effects modelling of outcomes per person per quarter.

Further details of the methods and how to interpret the reported results can be found in Section 4.2

Length of stay, time spent in a psychiatric unit and time spent in ICU

Linear regression modelling was used to estimate the mean length of stay per admission, the time spent in a psychiatric unit and time spent in ICU. The results showed no evidence of a significant impact on CL on any of these variables (Results are available from CHERE upon request).

Number of admissions

The regression analysis of predicted number of admissions was undertaken at a patient level, predicting the average number of admissions per quarter over the 2.5 year observation period. The standard errors were corrected to account for multiple observations per patient. Because the outcome variable is a count of admissions, we use a negative binomial regression technique which is appropriate for analysing over dispersed[12] count data. The results are reported as incident rate ratios (IRRs) in Table 4.40 for ease of interpretation.

[12] over dispersion = variance>mean

Table 4.40 Random effects negative binomial regression analysis of admissions per quarter per person

	Base case	Relative to base case		
Variable	**No D&A problem**	**ASSIST brief, no CL**	**ASSIST intense, no CL**	**Received CL**
Start of the observation period	-	1.534**	1.995**	0.729
Time trend	1.273***	0.965	0.936	1.274***
Shift after the intervention period	0.508***	1.658	1.445	1.434
Change in time trend after intervention period	0.762***	0.764*	0.887	0.710**

Notes: Results are reported as the incident rate ratio. n=10,790 represents 10 quarters of observations for 1079 individuals. Controls for patient and hospital characteristics, survey time and group means for time varying explanatory variables.
****, **, * = significant at 1%, 5% and 10% levels respectively.*

Incident rate ratios (IRRs) indicate the marginal effect of each variable on the number of admissions. An IRR greater than one indicates an increase in the number of admissions, an IRR of less than one indicates a decrease. After controlling for patient socio-demographic characteristics, individual hospital differences, and the survey period, the results indicate that there has been an increasing trend in the number of admissions over time at a rate of 27% per quarter (IRR=1.273, p=0.000) for those that did not have a D&A problem. This trend was similar for those that screened ASSIST positive (brief and intense) but did not receive CL. For those that received CL during the observation period, the trend in the number of admissions per quarter was significantly higher than those that did not have a D&A problem (IRR=1.274, p= 0.002).

After the modelled intervention period patients with no D&A problems had a downward shift of 50% in the frequency of admissions (IRR= 0.508, p=0.000) and a 24% decrease in the trend in number of admissions over time (IRR=0.762, p=0.000). The downward shift did not vary significantly by ASSIST screen or CL status. Those that received CL during the observation period had a further 29% decrease in the change in trend in number of admissions over time compared to those without D&A problems (IRR=0.710, p=0.011), which is similar to the brief intervention group (although for the brief intervention group the difference in change in trend is not significant at the 5% level). In contrast, those requiring an intensive intervention but who did not see CL did not have a significant change in the trend in admissions over time. This suggests that over time the rate of admissions decreased for people who received CL relative to the comparison group.

Total admitted patient costs

Linear regression modelling was used to estimate the total cost of admissions per quarter

Table 4.41 Random effects regression of cost of AP admissions per quarter per person

	Base case	Relative to base case		
Variable	**No D&A problem**	**ASSIST brief, no CL**	**ASSIST intense, no CL**	**Received CL**
Start of the observation period	-	556.10	191.96	-99.22
Time trend	253.80	131.72	202.32	324.46
Shift after the intervention period	-621.38	-777.41	-956.09	1383.72
Change in time trend after intervention period	-439.69**	-81.93	-148.79	-547.66

Notes: Results are reported as the coefficient. n=10,790 represents 10 quarters of observations for 1079 individuals. Controls for patient and hospital characteristics and survey time.
****, **, * = significant at 1%, 5% and 10% levels respectively.*

The regression results represent the marginal effect of each characteristic on the total cost of admissions per quarter (in dollars). A positive coefficient represents an increase in costs, a negative coefficient represents a decrease in costs. After controlling for patient socio-demographic characteristics, individual hospital differences, and the survey period, the results indicate that there has been an increasing trend in the cost of admissions per quarter over time (p=0.000) for those that did not have a D&A problem. This trend was not significantly different for those that screened ASSIST positive (brief and intense) but did not receive CL and those that received CL during the observation period.

After the modelled intervention period patients with no D&A problems had a decrease in the trend in total costs per quarter (p=0.018). This change in trend did not differ significantly for patients with D&A problems, whether or not they received CL.

Summary and Conclusions

The regression results indicate that CL services may decrease the rate of admissions over time relative to the comparison group. The regression results did not provide any evidence of an impact of CL on costs relating to admissions over the period of the evaluation.

4.6. PBS data analysis

The data

PBS data for consenting patients was analysed to determine differences in scripts between patients with and without underlying D&A problems, and differences between patients with underlying D&A problems who did not see CL and those who saw CL during the 2.5 year observation period.

Data for St Vincent's Hospital are censored at 31/12/2012 (the final extraction date consented to on the Medicare consent forms), which is slightly less than one year post the survey. Therefore, for the last quarter of the observation period we observe up to 20 days less than a full quarter for St Vincent's patients, depending on the exact date of the patient survey. St Vincent's Hospital PBS data for the final quarter has been weighted accordingly, although this has little impact on the results.

In addition to analysing overall PBS claims, we also focussed on PBS items with Anatomical, Therapeutic, Chemical classifications (ATC codes) which may be related to D&A problems. Prior to undertaking the analysis, ATC codes were reviewed and the codes listed in Table 4.42 below were determined as capturing prescription drugs that may be used more frequently by people with D&A problems:

Table 4.42 Selected ATC Codes for PBS data analysis

N02A	Opioids
N06A	Antidepressants
N06B	Psychostimulants
N06C	Pscyholeptics combined with psychoanaleptics
N05A	Antipsychotics
N05B	Anxiolytics
N05C	Hypnotics and sedatives
N07B	Drugs used in addictive disorders

The analyses are based on the subsample of Study 2 participants who also consented to PBS data extraction. Costs were inflated to 2012 prices using inflation rates derived from the AIHW pharmaceutical price index (AIHW, 2013, p.109).

Patient characteristics

Table 4.43 Study 2 patients who consented to PBS data extraction by patient characteristics and ASSIST D&A screen status

Characteristic:	All consenting patients n=682	Screened negative n=431	Screened positive: brief intervention n=188	Screened positive: intensive intervention n=63	Significant difference across categories p-value
Mean age; range	42; 16-98 (41-43)	45; 16-98 (43-46)	38; 16-90 (36-40)	36; 17-61 (33-38)	0.000
Gender, male %	55.13 (51.39-58.87)	50.58 (45.85-55.31)	60.64 (53.62-67.65)	69.84 (58.40-81.29)	0.003
Aboriginal or Torres Strait Islander %	5.15 (3.49-6.82)	3.73 (1.93-5.53)	5.88 (2.49-9.27)	12.70 (4.40-21.00)	0.009
Australian born %	83.38 (80.58-86.19)	81.90 (78.26-85.55)	86.56 (81.64-91.48)	84.13 (75.01-93.24)	0.357

Note: n=682, excludes 10 patients with insufficient information for ASSIST screening. Estimates of Indigenous status also exclude 3 patients who did not answer this question. Estimates of place of birth exclude 2 patients who did not answer this question. Age is the age reported at the time of the patient survey. 95% confidence intervals in parentheses.

Table 4.44 Study 2 patients who consented to PBS data extraction by CL referral and ASSIST D&A screen status

Characteristic:	Screened negative, no CL referral n=428	Screened positive: brief intervention, no CL referral n=183	Screened positive: intensive intervention, no CL referral n=50	CL group n=22	Significant difference across categories p-value
Mean age; range	45; 16-98 (43-46)	38; 16-90 (36-40)	34; 17-61 (31-37)	40; 22-59 (36-44)	0.000
Gender, male %	50.47 (45.72-55.22)	60.66 (53.55-67.77)	70.00 (57.15-82.85)	68.18 (48.23-88.14)	0.007
Aboriginal or Torres Strait Islander %	3.52 (1.77-5.28)	5.49 (2.17-8.82)	10.00 (1.59-18.41)	23.81 (5.11-42.51)	0.000
Australian born %	82.01 (78.36-85.66)	86.26 (81.24-91.29)	84.00 (73.72-94.28)	85.00 (68.92-101.08)	0.632

Note: total n=683, 9 patients excluded with insufficient ASSIST or CL information (one of the 10 patients with no ASSIST information was referred to CL so is included in the CL column above). 95% confidence intervals in parentheses.

The demographic characteristics of the sample who consented to PBS data extraction are similar to the overall Study 2 sample. However, there are proportionally more Aboriginal and Torres Strait Islander respondents in the PBS sample, particularly in the CL group.

Analyses

In Part 1 of this section, PBS prescriptions per quarter are compared by the patient's ASSIST screen status in the survey, to determine whether PBS utilisation and costs differ for patients with underlying D&A problems and by the intensity of intervention required. In Part 2, comparisons of PBS prescriptions per quarter are made between people who screened positive but did not see CL (split by intensity of intervention required) and for those for people who did see CL at some stage during our 2.5 year observation period. This will provide an indication of the appropriate comparison group for the subsequent regression analyses. Finally, random effects regression analyses are undertaken and reported in Part 3, to investigate differences in PBS utilisation by intensity of intervention need and CL status, controlling for other factors, and changes in PBS utilisation over time for people who had a CL intervention relative to the comparison group.

Part 1: Comparisons of average PBS scripts per quarter by ASSIST screen status

Table 4.45 Average number of PBS scripts per person per quarter by ASSIST D&A screen status

PBS items:	All consenting patients n=6820	Screened negative n=4310	Screened positive: brief intervention n=1880	Screened positive: intensive intervention n=630	Significant difference across categories p-value
All scripts	4.26 (3.69-4.82)	4.04 (3.36-4.73)	4.43 (3.46-5.40)	5.19 (2.62-7.76)	0.612
Scripts for selected ATC codes	1.22 (0.97-1.48)	0.83 (0.59-1.07)	1.48 (1.09-1.87)	3.17 (1.36-4.98)	0.002

Note: n=6820 = 10 quarters x 682 patients. Standard errors corrected for multiple observations per person. 95% confidence intervals in parentheses.

There is no significant difference by ASSIST D&A screen status in total scripts per patient per quarter (p=0.612). However, when we examine the subset of scripts for selected ATC codes (based on the list in Table 4.42) there are significant differences by screen status. Pairwise comparisons show that people who screened positive have more of the selected scripts per quarter than those who screened negative (p values 0.006 and 0.012 for people with brief and intensive intervention need respectively). People who screened as needing an intensive intervention have twice as many selected scripts as those only needing a brief intervention but this difference is not significant at the 5% significance level (p value = 0.073).

Table 4.46 Average total cost of PBS scripts per quarter by ASSIST D&A screen status

PBS items:	All consenting patients n=6820	Screened negative n=4310	Screened positive: brief intervention n=1880	Screened positive: intensive intervention n=630	Significant difference across categories p-value
All scripts:					
Patient contribution $	27.88 (24.94-30.81)	26.99 (23.20-30.77)	30.86 (25.23-36.49)	25.09 (17.57-32.62)	0.405
Net Benefit $	204.22 (166.76-241.69)	196.77 (150.06-243.48)	212.84 (138.59-287.09)	229.53 (114.62-344.44)	0.845
Selected ATC codes:					
Patient contribution $	7.39 (6.06-8.72)	5.49 (3.90-7.08)	9.18 (6.79-11.58)	14.97 (9.29-20.65)	0.001
Net Benefit $	57.28 (39.79-74.78)	38.81 (19.23-58.39)	62.95 (31.75-94.15)	166.73 (75.18-258.29)	0.017

Note: n=6820 = 10 quarters x 682 patients. Standard errors corrected for multiple observations per person. Costs are expressed in 2012 prices. 95% confidence intervals in parentheses.

When looking at all prescriptions, there are no statistically significant differences in average costs per patient per quarter by ASSIST D&A screen status. However, there are significant differences in costs of the selected PBS items per quarter by ASSIST D&A screen status (both for patient contribution and net benefit paid). Pairwise comparisons show that people who screened positive have significantly higher out-of-pocket costs for the selected scripts per quarter than those who screened negative (p values 0.012 and 0.002 for people with brief and intensive intervention need respectively). Pairwise comparisons also show a significant difference (p=0.036) between the net benefit paid for the selected PBS items for people requiring an intensive intervention ($166.73) compared to those requiring a brief intervention ($62.95).

We also compared numbers and costs of prescriptions for people who screened positive for opioids in the survey compared to other patients with D&A problems (as suggested at the March 2014 meeting with NSW Health). The results are presented in Table 4.47 and Table 4.48below.

Table 4.47 Average number of PBS scripts for people screened positive for Opiods vs other D&A

PBS items:	**Screen Positive for Opioids n=410**	**Other Positive D&A Screen n=2090**	**Significant difference p-value**
All scripts	10.18 (6.26-14.10)	3.57 (2.78-4.37)	0.001
Scripts for selected ATC codes	5.64 (2.93-8.36)	1.19 (0.90-1.49)	0.002

Note: n=2500 = 10 quarters x 250 patients. Standard errors corrected for multiple observations per person. 95% confidence intervals in parentheses.

People who screened positive for opioids have significantly more prescriptions, for all items and for the selected PBS items, than other people with D&A problems.

Table 4.48 Average total cost of PBS scripts per quarter for people screened positive for Opiods vs other D&A

PBS items:	**Screen Positive for Opioids n=410**	**Other Positive D&A Screen n=2090**	**Significant difference across categories p-value**
All scripts:			
Patient contribution $	45.05 (32.78-57.32)	26.58 (21.68-31.48)	0.006
Net Benefit $	351.66 (191.79-511.52)	193.97 (126.02-261.91)	0.075
Selected ATC codes:			
Patient contribution $	23.71	8.21	0.000

		(15.70-39.80)	(6.10-10.33)	
	Net Benefit $	220.99	66.60	0.019
		(96.19-345.78)	(35.81-97.40)	

Note: n=2500 = 10 quarters x 250 patients. Standard errors corrected for multiple observations per person. 95% confidence intervals in parentheses.

Consistent with the difference in numbers of scripts, people who screened positive for opioids have significantly higher patient contributions, for all items and for the selected PBS items, than other people with D&A problems. For the selected ATC codes, the net benefit paid is $154 higher for people who screened positive for opioids than for other people with D&A problems (p=0.019).

Part 2: Comparisons of average quarterly PBS scripts for patients who received CL during the 2.5 year observation period and those who screened positive in Study 1 but did not see CL during the observation period.

Table 4.49 and Table 4.50 compare average quarterly PBS items and costs respectively between people who screened positive but did not see CL (split by level of intervention need) and for those for people who did see CL during our 2.5 year observation period.

Table 4.49 Average number of PBS scripts per person per quarter by intensity of need and CL status

PBS items:	Screened positive: brief intervention (no CL) n=1830	Screened positive: intensive intervention (no CL) n=500	CL group n=137	Significant difference across categories p-value
All scripts	4.37 (3.38-5.36)	5.34 (2.18-8.50)	4.85 (2.81-6.89)	0.800
Selected ATC codes	1.37 (0.98-1.75)	3.37 (1.15-5.58)	2.98 (1.40-4.55)	0.038

Total n=2550 includes 10 quarters of observations for 255 people. This includes 22 people who were referred to CL during the 2.5 year observation period and 233 people who screened positive but did not see CL. Standard errors are corrected for multiple observations per person. 95% confidence intervals in parentheses.

There is no overall statistically significant difference in the total number of prescriptions between patients with a D&A problem when split by intensity of need and CL status. However, when we examine the subset of prescriptions with selected ATC codes, the overall differences between the groups are significant (p=0.038). Pairwise comparisons indicate that the number of selected scripts for the CL group and those with intensive intervention need, who did not see CL, are not significantly different from each other (0.779). This supports the use of the group who screened as having an intensive intervention need as a comparison group in the regression analyses in part 3.

Table 4.50 Average total cost of PBS scripts per person per quarter by intensity of need and CL status

PBS items:	Screened positive: brief intervention (no CL) n=1830	Screened positive: intensive intervention (no CL) n=500	CL group n=220	Significant difference across categories p-value
All scripts $				
Patient contribution	30.73 (24.94-36.51)	24.79 (16.29-33.30)	26.96 (15.49-38.43)	0.504
Net Benefit	201.96 (127.24-276.69)	245.92 (108.15-383.70)	309.05 (108.07-510.04)	0.572

Selected ATC codes				
Patient contribution	8.62 (6.24-10.99)	15.00 (8.62-21.38)	17.26 (8.18-26.34)	0.048
Net Benefit	48.54 (22.35-74.74)	177.38 (70.15-284.61)	273.32 (72.48-474.16)	0.009

Total n=2550 includes 10 quarters of observations for 255 people. This includes 22 people who were referred to CL during the 2.5 year observation period and 233 people who screened positive but did not see CL. Standard errors are corrected for multiple observations per person. 95% confidence intervals in parentheses.

Consistent with the results for numbers of PBS items, there is no significant difference in costs for all scripts by intensity of need and CL status. However, there is a significant difference between groups in the costs per patient per quarter for the selected PBS items (p=0.048 and p = 0.009 respectively for patient contribution and net benefit paid). When pairwise comparisons were undertaken we found that, for the selected items, net PBS benefits for people who have intense intervention need (no CL) and for those in the CL group are both significantly different from the group needing a brief intervention (p=0.022 and p=0.030). The net benefit per quarter for selected items for people who were referred to CL was not significantly different from people who screened as requiring an intensive intervention but who did not see CL (p=0.407).

Part 3: Regression analyses

Number of PBS scripts

The regression analysis of predicted number of PBS scripts was undertaken at a patient level, predicting the average number of scripts per quarter over the 2.5 year observation period. We use random effects modelling to examine changes over time as well as differences between individuals. We used a negative binomial regression technique which is appropriate for analysing over dispersed[13] count data. The results are reported as incident rate ratios (IRRs) in Table 4.51 for ease of interpretation.

Table 4.51 Random effects negative binomial regression analysis of PBS scripts per person per quarter

	Base case	Relative to base case		
Variable	No D&A problem	ASSIST brief, no CL	ASSIST intense, no CL	Received CL
Start of the observation period	-	1.14	1.76***	1.61*
Time trend	1.02**	1.07***	1.02	1.01
Shift after the intervention period	1.06	0.80*	1.05	1.15
Change in time trend after intervention period	0.96	1.00	0.89	1.03

Notes: Results are reported as incident rate ratios. n=6830 represents 10 quarters of observations for 683 individuals. Also controlled for patient characteristics, time of survey and hospital where surveyed.
****, **, * = significant at 1%, 5% and 10% levels respectively.*

The results indicate that, after controlling for other differences, people who screen positive for D&A problems in the survey and who are in need of an intensive intervention had 76% more PBS prescriptions on average in the first quarter we observe them (IRR= 1.76), than people who screened negative for D&A problems. The difference in scripts in the first quarter of our observation period for people who saw CL and people requiring intensive intervention but who did not see CL are not statistically different from each other – reaffirming that the intensive intervention group are a suitable comparator to the CL group. On average, there has been a small increasing trend in prescriptions over time of 2% (IRR=1.020) per quarter. The trend is 7% higher for people who screened as requiring a brief intervention. There is no significant difference in the trend over time for people with a need for intensive intervention or those who were referred to CL compared to people without D&A problems. After the intervention period, there is no significant change in the average number of scripts for the CL group or for the comparison group.

[13] Over dispersion: variance>mean

Number of PBS scripts for selected ATC codes

We repeated the analysis for the subgroup of prescriptions for selected ATC codes. The results are reported in Table 4.52 below.

Table 4.52 Random effects negative binomial regression analysis of selected PBS scripts per patient per quarter

	Base case	Relative to base case		
Variable	**No D&A problem**	**ASSIST brief, no CL**	**ASSIST intense, no CL**	**Received CL**
Start of the observation period	-	1.84***	3.85***	5.25***
Time trend	1.06***	1.06**	1.00	0.94
Shift after the intervention period	0.80	1.06	1.35	1.65**
Change in time trend after intervention period	0.93	0.93	0.87	1.10

Notes: Results are reported as incident rate ratios. n=6830 represents 10 quarters of observations for 683 individuals. Also controlled for patient characteristics, time of survey and hospital where surveyed.
****, **, * = significant at 1%, 5% and 10% levels respectively.*

When looking at PBS scripts per quarter for selected ATC codes, at the start of the observation period we found greater numbers of scripts for people with D&A problems compared to people without D&A problems. In particular, people who screened as requiring intensive intervention have 3.85 times as many of these scripts compared to people without D&A problems. Similarly people in the CL group have 5.25 times as many selected scripts as people without D&A problems at the start of the observation period. There is no significant difference between the CL and intensive need groups at baseline. For the group without D&A problems, there is a small increase in scripts over time of 6% per quarter (IRR = 1.06). The trend over time is not significantly different for the CL group or for the intensive need group compared to the no D&A group (but it is slightly higher for people with a brief intervention need). Following the intervention period, the average number of selected scripts increases for the CL group by 65% (IRR = 1.65), whilst no significant change is observed for other groups. This indicates that CL may lead to increased PBS drug utilisation for the selected prescriptions. This may reflect greater uptake of appropriate treatment and should not be interpreted as a negative result.

Cost of PBS scripts for selected ATC codes

We also ran random effects regression models for PBS costs. No differences were detected pre- and post- intervention in the cost of all scripts (results available from CHERE on request). However, for the selected group of ATC codes, there is evidence of a cost difference following the intervention. The results for net benefit paid for selected scripts are presented in Table 4.53 below.

Table 4.53 Random effects regression analysis of net benefit paid for selected PBS scripts per patient per quarter

	Base case	Relative to base case		
Variable	No D&A problem	ASSIST brief, no CL	ASSIST intense, no CL	Received CL
Start of the observation period	-	27.45	154.12***	351.36***
Time trend	2.92	-0.86	5.84	-25.73***
Shift after the intervention period	25.07*	-14.20	48.04	12.60
Change in time trend after intervention period	-12.22**	5.34	-57.25***	32.11**

Notes: Results are reported as the coefficient. n=6830 represents 10 quarters of observations for 683 individuals. Also controlled for patient characteristics, time of survey, hospital where surveyed and group means for time varying explanatory variables.
****, **, * = significant at 1%, 5% and 10% levels respectively.*

At the start of the observation period, people who screened as requiring an intensive intervention and people who were referred to CL during the observation period had greater net benefits paid ($154 and $351 respectively) for selected PBS items than people without D&A problems. The CL group had higher net benefits at baseline than the comparison (intensive need) group but for the CL group there was an initial decreasing trend over time of $25. Following the intervention period, the trend over time decreased for the comparison group but increased for the CL group. The difference in the change in trend in selected PBS script costs for the CL group versus the comparison (i.e. intensive need) group following the intervention is $89.36 per quarter (32.11 + 57.25). This equates to $893.60 over the first year post intervention.[14]

Summary and conclusions

Evidence from the analysis of PBS scripts indicates that people in need of intensive D&A intervention and people who were referred to CL during the observation period use more prescription drugs than other people. When we focus on a subset of PBS items which may be expected to be prescribed more frequently to people with D&A problems, we find that use of the selected items is much higher for the intensive intervention need and CL patient groups. For people who were referred to CL, there is evidence of an increase in selected PBS scripts after being seen by the CL service, equating to $893.60 in the year after the intervention. This cost increase may reflect appropriate use of health care services and should not be interpreted as a negative impact of CL. Moreover when we considered all scripts, there is no longer a significant difference in costs, suggesting that the increase in cost of selected scripts may be offset by a decrease in others.

[14] (89.36 in the 1st quarter + 2 x 89.36 in the 2nd quarter + 3 x 89.36 in the 3rd quarter + 4 x 89.36 in the 4th quarter)

4.7.MBS data analysis

The data

MBS data for consenting patients was analysed to determine differences in medical service utilisation

a) between patients with and without underlying D&A problems, and
b) between patients with underlying D&A problems and did not see CL and those that saw CL during the 2.5 year observation period.

Data for St Vincent's Hospital are censored at 31/12/2012 (the final extraction date consented to on the Medicare consent forms), which is slightly less than one year post the survey. Therefore, for the last quarter of the observation period we observe up to 20 days less than a full quarter for St Vincent's patients, depending on the exact date of the patient survey. St Vincent's MBS data for the final quarter has been weighted accordingly.

In addition to overall MBS claims, we also focussed on a selection of MBS items which may be related to D&A problems or which may be expected to change following referral to CL. Prior to undertaking the analysis, MBS item categories were reviewed and the items listed in Table 4.54 below were determined as services that may be used more frequently by people with D&A problems. These will be referred to as the 'selected services'.

Table 4.54 Selected items for MBS data analysis

Item Category	Item Description
A1	General Practitioner
A2	Other non-referred
A5	Prolonged
A8	Consultant Psychiatrist
M6	Psychological Therapy Services
M7	Focussed Psychological Strategies
A11	After Hours
A14	Health Assessments
A15	Multidisciplinary Care Plans and Case Conferences
A20	GP Mental Health Treatment
A22	GP after-hours attendances to which no other item applies
A23	Other non-referred after-hours attendances to which no other item applies
A30	Medical Practitioner (GP/Spec/or Cons. Phy.) Telehealth Attendances

The analyses are based on the subsample of Study 2 participants who also consented to MBS data extraction.

Costs were inflated to 2012 prices using inflation rates derived from the AIHW medical services price index (AIHW, 2013, p.109).

Patient characteristics

Table 4.55 Study 2 patients who consented to MBS data extraction by patient characteristics and ASSIST D&A screen status

Characteristic:	All consenting patients n=866	Screened negative n=549	Screened positive: brief intervention n=240	Screened positive: intensive intervention n=77	Significant difference across categories p-value
Mean age; range	42; 16-98 (40-43)	44; 16-98 (42-45)	38; 16-90 (36-41)	35; 17-61 (32-38)	0.000
Gender, male %	54.85 (51.53-58.17)	51.37 (47.18-55.56)	58.75 (52.50-65.00)	67.53 (56.99-78.07)	0.010
Aboriginal or Torres Strait Islander %	4.40 (3.03-5.77)	3.11 (1.65-4.57)	5.44 (2.55-8.32)	10.39 (3.52-17.26)	0.009
Australian born %	83.41 (80.92-85.90)	81.90 (79.64-90.12)	85.71 (81.25-90.18)	87.01 (79.44-94.58)	0.281

Note: n=866, excludes 19 patients with insufficient information for ASSIST screening. Age is the age reported at the time of the patient survey. 95% confidence intervals in parentheses.

Table 4.56 Study 2 patients who consented to MBS data extraction by CL referral and ASSIST D&A screen status

Characteristic:	Screened negative, no CL referral n=545	Screened positive: brief intervention, no CL referral n=233	Screened positive: intensive intervention, no CL referral n=58	CL group* n=30	Significant difference across categories p-value
Mean age; range	44; 16-98 (42-46)	39; 16-90 (36-41)	34; 17-61 (31-37)	37; 17-59 (33-42)	0.000
Gender, male %	51.38 (47.17-55.58)	58.80 (52.46-65.14)	68.97 (56.94-80.99)	60.00 (42.14-77.86)	0.028
Aboriginal or Torres Strait Islander %	2.95 (1.52-4.37)	5.17 (2.31-8.03)	8.62 (1.32-15.92)	16.67 (3.08-30.25)	0.001
Australian born %	81.95 (78.71-85.19)	85.34 (80.78-89.91)	86.21 (77.24-95.17)	89.66 (78.36-100)	0.456

Note: total n=866, 19 patients excluded with insufficient information for ASSIST screening. 95% confidence intervals in parentheses.
**Patient referred to CL at some point in the 2.5 year observation period.*

The demographic characteristics of the sample who consented to MBS data extraction are similar to the overall Study 2 sample.

Part 1: Comparisons of MBS items by ASSIST screen status

We examined the average number of MBS services claimed per patient per quarter during the 2.5 year observation period. Overall, patients claimed an average of 7.56 MBS services per quarter. When this was broken down by type of service, 2.50 services related to GP consultations, 3.50 related to diagnostic and pathology services and 1.55 of these services were for other attendances, including specialists.

Table 4.57 Average number of MBS services per patient per quarter by ASSIST D&A screen status

MBS services:	**All consenting patients n=8660**	**Screened negative n=5490**	**Screened positive: brief intervention n=2400**	**Screened positive: intensive intervention n=770**	**Significant difference across categories p-value**
GP services[1]	*2.50 (2.29-2.71)*	*2.28 (2.05-2.50)*	*2.82 (2.38-3.26)*	*3.11 (2.07-4.14)*	*0.038*
Diagnostic and pathology services[2]	*3.50 (3.09-3.92)*	*3.87 (3.27-4.46)*	*3.03 (2.47-3.59)*	*2.37 (1.61-3.14)*	*0.008*
Other attendances[3]	*1.55 (1.39-1.71)*	*1.62 (1.41-1.84)*	*1.49 (1.21-1.78)*	*1.21 (0.82-1.60)*	*0.185*
All services (total)	7.56 (6.92-8.21)	7.78 (6.89-8.65)	7.35 (6.32-8.38)	6.71 (4.79-6.31)	0.575
Selected services	2.68 (2.45-2.91)	2.40 (2.16-2.65)	3.05 (2.58-3.52)	3.47 (2.33-4.61)	0.016

Note: n=8660 = 10 quarters x 866 patients. Standard errors corrected for multiple observations per person. 95% confidence intervals in parentheses.

1: Includes MBS item categories A01, A02, A05, A11, A14, A15, A17, A18, A19, A20, A22, A23

2: Includes MBS item categories D01, D02, I01, I02, I03, I04, I05, P01, P02, P03, P04, P05, P06, P07, P08, P09, P10, P11

3: Includes MBS item categories A03, A04, A06, A07, B01, M02, M03, M09, N01, N02, N03, O01, O03, O07, T01, T02, T04, T06, T07, T08, T09, A10, A16, A21, A24, A26, A28, M11, M12, M14, T10

There is no significant difference by ASSIST D&A screen status in total services per patient per quarter (p=0.575). However, when we examine the data for selected services (based on the list in Table 4.54) there are significant differences by screen status. Pairwise comparisons show that people who screened positive as requiring a brief intervention use more of the selected services per quarter than those who screened negative (p=0.016). People who screened positive as requiring an intensive intervention also use more selected services than those who screened negative however this difference is not significant at the 5% significance level (p= 0.072).

We also examined the average total patient contribution paid for MBS services per quarter and the average total benefit paid to the patient (i.e. the cost incurred by the Government) per quarter. On average patients paid an average $88.66 per quarter for MBS services. On average the benefit paid to each patient per quarter was $396.72.

Table 4.58 Average total cost of MBS items per patient per quarter by ASSIST D&A screen status

MBS services:	All consenting patients n=8660	Screened negative n=5490	Screened positive: brief intervention n=2400	Screened positive: intensive intervention n=770	Significant difference across categories p-value
All services $					
Patient contribution	88.66 (75.02-102.29)	107.52 (88.20-126.85)	61.08 (42.33-79.83)	40.07 (12.49-67.66)	0.000
Net Benefit	396.72 (362.49-430.96)	406.34 (361.31-451.37)	387.61 (329.01-446.20)	356.54 (248.38-464.70)	0.673
Selected services $					
Patient contribution	11.08 (9.38-12.77)	11.41 (9.64-13.18)	8.38 (6.29-10.47)	17.14 (4.51-29.77)	0.053
Net Benefit	140.19 (125.87-154.52)	122.05 (107.59-136.50)	163.93 (131.59-196.27)	195.57 (126.23-264.90)	0.013

Note: n=8660 = 10 quarters x 866 patients. Standard errors corrected for multiple observations per person. Costs are expressed in 2012 prices. 95% confidence intervals in parentheses.

There is a significant difference in the patient contribution paid for all MBS services per quarter by ASSIST D&A screen status. Pairwise comparisons show that people who screened positive paid significantly less out-of-pocket expenses than those who screened negative (p values 0.001 and 0.000 for people with brief and intensive intervention need respectively).

There is also a significant difference between the net benefit paid for select MBS services by quarter by ASSIST D&A screen. Pairwise comparisons show that people who screened positive had a significantly higher net benefit than those who screened negative (p values 0.021 and 0.042 for people with brief and intensive intervention need respectively).

Part 2: Comparisons of MBS items for patients who received CL and those who screened positive in Study 1 but did not see CL during the observation period.

Table 4.59 Average number of MBS items per patient per quarter by CL status

MBS services:	Screened positive: brief intervention (no CL) n=2330	Screened positive: intensive intervention (no CL) n=580	CL group n=300	Significant difference across categories p-value
GP services[1]	*2.65 (2.26-3.03)*	*2.98 (1.74-4.24)*	*4.56 (2.44-6.68)*	*0.202*
Diagnostic and pathology services[2]	*3.04 (2.46-3.62)*	*2.29 (1.39-3.19)*	*2.80 (1.68-3.92)*	*0.389*
Other attendances[3]	*1.51 (1.21-1.80)*	*1.32 (0.82-1.82)*	*0.94 (0.55-1.33)*	*0.078*
All services (total)	7.20 (6.08-8.23)	6.62 (4.23-9.00)	8.31 (5.41-11.21)	0.673
Selected services	2.88 (2.46-3.30)	3.37 (1.97-4.76)	4.77 (2.65-6.90)	0.195

Note: n=3210 includes 10 quarters of observations for 30 people who were referred to CL during the 2.5 year observation period and 291 people who screened positive but did not see CL. Standard errors corrected for multiple observations period. 95% confidence intervals in parentheses.

1: Includes MBS item categories A01, A02, A05, A11, A14, A15, A17, A18, A19, A20, A22, A23

2: Includes MBS item categories D01, D02, I01, I02, I03, I04, I05, P01, P02, P03, P04, P05, P06, P07, P08, P09, P10, P11

3: Includes MBS item categories A03, A04, A06, A07, B01, M02, M03, M09, N01, N02, N03, O01, O03, O07, T01, T02, T04, T06, T07, T08, T09, A10, A16, A21, A24, A26, A28, M11, M12, M14, T10

There is no overall statistically significant difference in the number of services used between patients with a D&A problem when split by intensity of need and CL status.

Table 4.60 Average total cost of MBS items per patient per quarter by CL status

MBS services:	Screened positive: brief intervention (no CL) n=2330	Screened positive: intensive intervention (no CL) n=580	CL group n=300	Significant difference across categories p-value
All services $				
Patient contribution	62.30 (42.95-81.64)	35.77 (12.66-58.89)	39.24 (-16.47-94.94)	0.208
Net Benefit	381.73 (322.43-441.04)	368.72 (230.78-506.66)	381.68 (247.96-515.40)	0.985
Selected services				
$Patient contribution	8.50 (6.34-10.64)	20.81 (4.45-37.18)	5.37 (-1.41-12.14)	0.224
Net Benefit	155.93 (124.45-187.36)	196.33 (107.75-284.90)	239.80 (140.61-338.99)	0.227

Note: n=3210 includes 10 quarters of observations for 30 people who were referred to CL during the 2.5 year observation period and 291 people who screened positive but did not see CL. Standard errors corrected for multiple observations period. Costs are expressed in 2012 prices. 95% confidence intervals in parentheses.

Overall there were no significant differences by intensity of need and CL status in the patient contribution paid or net benefit per quarter per patient for all MBS services. There were also no significant differences by intensity of need and CL status in the patient contribution paid or net benefit per quarter per patient for selected services.

Part 3: Regression analyses

Number of MBS items

The regression analysis of predicted number of MBS items was undertaken at a patient level, predicting the average number of items per quarter over the 2.5 year observation period. Because the outcome variable is a count, we use a negative binomial regression technique which is appropriate for analysing over dispersed[15] count data. We use random effects modelling to examine changes over time as well as differences between individuals. The results are reported as incident rate ratios (IRRs) in Table 4.61 for ease of interpretation.

Table 4.61 Random effects negative binomial regression analysis of MBS services per person per quarter

	Base case	Relative to base case		
Variable	No D&A problem	ASSIST brief, no CL	ASSIST intense, no CL	Received CL
Start of the observation period	-	1.219***	1.229*	0.914
Time trend	1.068***	0.999	1.008	0.997
Shift after the intervention period	0.888*	1.049	0.977	1.069
Change in time trend after intervention period	0.906***	0.991	1.017	1.048

Notes: Results are reported as incident rate ratios. n=8660 represents 10 quarters of observations for 866 individuals. Also controlled for patient characteristics, time of survey, hospital where surveyed and group means for time varying explanatory variables.
****, **, * = significant at 1%, 5% and 10% levels respectively.*

Incident rate ratios (IRRs) indicate the marginal effect of each variable on the number of admissions. An IRR greater than one indicates an increase in the number of services, an IRR of less than one indicates a decrease. After controlling for patient socio-demographic characteristics, individual hospital differences, and the impact of the survey period the results indicate that at the start of the observation period people who screen positive for D&A problems in the survey (brief or negative) use more MBS services, on average than people who screened negative for D&A problems.

There has been an increasing trend in the number of MBS services claimed over time (6.8% (IRR=1.068, p=0.000) for those that did not have a D&A problem. This trend was similar for those who screened ASSIST positive (brief and intense) but did not receive CL and those who received CL during the observation period.

After the modelled intervention period patients with no D&A problems had a 10% decrease in the trend over time in the number of MBS services claimed (IRR=0.906, p=0.001). The change in trend for patients with an ASSIST positive screen (brief or negative) and patients that received CL, did not vary significantly from those who screened as having no D&A problems.

[15] variance>mean

Number of MBS items for selected MBS services

Table 4.62 Random effects negative binomial regression analysis of selected services per person per quarter

	Base case	Relative to base case		
Variable	No D&A problem	ASSIST brief, no CL	ASSIST intense, no CL	Received CL
Start of the observation period	-	1.273***	1.383**	0.636**
Time trend	1.056***	1.010	0.989	1.030
Shift after the intervention period	0.875*	1.025	1.117	1.035
Change in time trend after intervention period	0.930**	0.972	1.002	1.010

Notes: Results are reported as incident rate ratios. n=8660 represents 10 quarters of observations for 866 individuals. Also controlled for patient characteristics, time of survey, hospital where surveyed and group means for time varying explanatory variables.
****, **, * = significant at 1%, 5% and 10% levels respectively.*

At the start of the observation period, people who screened positive for D&A problems in the survey used on average, more of the selected MBS services per quarter than people who screened negative for D&A problems. Those who screened as needing a brief intervention used 1.27 times and those who screened as needing an intensive intervention used 1.38 times as many MBS services than people who screened negative for D&A problems. People who received CL during the observation period, used on average 1.57 times fewer selected MBS services than those without D&A problems at the start of the observation period.

On average, there has been a small increasing trend in use of these services over time of 5.6% (IRR=1.056) per quarter. There are no significant differences at the 5% significance level in this trend over time by ASSIST screen or CL status. After the modelled intervention period, the trend over time in the number of these MBS services claimed by patients with no D&A problems decreased by 7% decrease (IRR=0.930, p=0.013). This trend did not vary significantly by ASSIST screen or CL status.

Benefit paid for MBS services

Table 4.63 Random effects regression analysis of the net benefit paid for MBS services per person per quarter

	Base case	Relative to base case		
Variable	**No D&A problem**	**ASSIST brief, no CL**	**ASSIST intense, no CL**	**Received CL**
Start of the observation period	-	46.91	47.67	21.30
Time trend	35.84***	-9.40	0.31	-24.11
Shift after the intervention period	-131.87***	99.84	-36.00	130.90
Change in time trend after intervention period	-35.62*	-0.80	56.54	64.43

Notes: Results are reported as the coefficient. n=8660 represents 10 quarters of observations for 866 individuals. Also controlled for patient characteristics, time of survey and hospital where surveyed.
****, **, * = significant at 1%, 5% and 10% levels respectively.*

On average, there has been a small increasing trend in net benefit paid per quarter ($35.84) for MBS services over time. There are no significant differences in this trend over time by ASSIST screen or CL status. Following the modelled intervention, there is a downward shift in costs per quarter of $131.87 (p=0.008) for MBS services claimed, which does not differ significantly by patient group.

Summary and conclusions

Evidence from the analysis of MBS services indicates that people who screened positive for D&A problems used a similar number of MBS services than those that screened negative; however they paid significantly lower out-of-pocket expenses for MBS services. The net benefit (cost to government) did not vary significantly by ASSIST screen. Descriptive statistics also indicate that the utilisation of MBS services was similar amongst those that saw CL and those that screened positive, requiring an intensive intervention. For people who saw CL, the regression results do not provide any evidence of a change in uptake of MBS services due to the intervention.

4.8. Total cost analysis

In this section we use the subset of participants in Study 2 who consented to both MBS and PBS data extraction to estimate differences in average total cost to the health system between patients with and without underlying D&A problems and before and after referral to CL. Total costs are calculated as the sum of ED cost, DRG cost, MBS and PBS costs per patient over the 2.5 year observation period.

Patient characteristics

Table 4.64 Characteristics of subset of Study 2 patients who consented to MBS and PBS data extraction by ASSIST D&A screen status

Characteristic:	All patients consenting to MBS+PBS+NSW Health data n=674	Screened negative n=427	Screened positive: brief intervention n=184	Screened positive: intensive intervention n=63	Significant difference across categories p-value
Mean age (range) (95% CI)	42 (16-98) (41-43)	45 (16-98) (43-47)	38 (16-90) (36-41)	36 (17-61) (33-38)	0.000
Gender, male% (95% CI)	55.19% (51.43-58.96)	50.35% (45.59-55.11)	61.41% (54.35-68.48)	69.84% (58.40-81.29)	0.002
Aboriginal or Torres Strait Islander % (95% CI)	5.21% (3.53-6.90)	3.76% (1.95-5.58)	6.01% (2.55-9.47)	12.70% (4.40-21.00)	0.010
Australian born % (95% CI)	83.18% (80.35-86.02)	81.73% (78.06-85.41)	86.26% (81.24-91.29)	84.13% (75.01-93.24)	0.384

Note: n=674, excludes 9 patients with insufficient information for ASSIST screening. Age is the age reported at the time of the patient survey.

Table 4.65 Characteristics of subset of Study 2 patients who consented to MBS and PBS data extraction by ASSIST D&A screen and CL status

Characteristic:	Screened negative, no CL n=424	Screened positive: brief intervention, no CL n=179	Screened positive: intensive intervention, no CL n=50	CL group n=21	Significant difference across categories p-value
Mean age (range) (95% CI)	45 (16-98) (43-47)	38 (16-90) (36-41)	34 (17-61) (31-37)	40 (22-59) (36-44)	0.000
Gender, male% (95% CI)	50.24% (45.46-55.01)	61.45% (54.29-68.62)	70.00% (57.15-82.85)	66.67% (45.97-87.36)	0.006
Aboriginal or Torres Strait Islander % (95% CI)	3.55% (1.78-5.33)	5.62% (2.22-9.01)	10% (1.58-18.42)	23.81% (5.11-42.51)	0.000
Australian born % (95% CI)	81.84% (78.16-8.52)	85.96% (80.83-91.08)	84.00% (73.72-94.28)	85.00% (68.92-100)	0.660

Note: total n=674, excludes 9 patients with insufficient information for ASSIST screening. Age is the age reported at the time of the patient survey.

The demographic characteristics of the subsample who consented to all types of data extraction are similar to the overall Study 2 sample. However, there are proportionally more Aboriginal and Torres Strait Islander respondents in the subsample, particularly in the CL group. The regression analyses control for Indigenous status so this is unlikely to have a major impact on the results.

Part 1: Comparisons of average total cost per person per quarter by ASSIST screen status

Average total costs are calculated by summing the average ED, AP, MBS and PBS costs for the subset of participants who consented to data extraction for all of these datasets. Three totals are provided: the grand total is the sum of all costs including patient out-of-pocket costs (OOPC) for the MBS and PBS items. The total less OOPC is also provided. The results are presented in Table 4.66.

Table 4.66 Average total cost per person per quarter by ASSIST D&A screen status

Resource type:	All patients consenting to MBS+PBS+NSW Health data n=6740	Screened negative n=4270	Screened positive: brief intervention n=1840	Screened positive: intensive intervention n=630	Significant difference across categories p-value
ED $	201	188	182	347	0.016
(95% CI)	(164-239)	(134-242)	(143-221)	(241-454)	
APDC $	1369	1456	1095	1579	0.200
(95% CI)	(1128-1609)	(1113-1798)	(787-1403)	(936-2221)	
PBS $					
Benefit paid	206	199	216	230	0.851
(95% CI)	(168-244)	(151-246)	(140-292)	(115-344)	
Patient OOPC	28	27	31	25	0.453
(95% CI)	(25-31)	(23-31)	(25-36)	(18-33)	
MBS $					
Benefit paid	407	415	394	395	0.882
(95% CI)	(367-447)	(363-466)	(323-465)	(265-524)	
Patient OOPC	92	110	64	47	0.001
(95% CI)	(76-107)	(89-132)	(41-87)	(13-80)	
Totals $					
Grand total	2303	2395	1981	2622	0.236
(95% CI)	(1994-2612)	(1956-2834)	(1581-2352)	(1796-3448)	
Total less OOPC	2184	2258	1887	2550	0.241
(95% CI)	(1881-2486)	(1828-2687)	(1497-2276)	(1738-3363)	

Note: n = 6740 = 10 quarters of observations for 674 individuals, excludes 9 patients with insufficient information for ASSIST screening. OOPC = out-of-pocket costs

The only statistically significant differences between patient costs by ASSIST screen status are in ED costs (which are higher for those who screened positive as requiring an intensive intervention) and out-of-pocket MBS costs (which are lower for those screened as needing an intensive intervention).

Costs for each service type by ASSIST screen status in the subset of 674 patients in this section are broadly consistent with those reported in previous sections using the full sample of people who consented to each dataset. The exception to this is admitted patient costs for people with a brief intervention need. For this group, the average cost of admissions for the full sample was much

higher at $1811. This difference is unlikely to make a large impact on the regression results as it does not affect the costs of the CL group or the comparison group (those with intensive need who did not see CL), reported below.

Part 2: Comparisons of average total cost per person per quarter for patients who were referred to CL and those who screened positive in Study 1 but did not see CL during the observation period.

Table 4.67 Average total cost per person per quarter by ASSIST screen and CL status

Resource type:	Screened positive: brief intervention (no CL) n=1790	Screened positive: intensive intervention (no CL) n=500	CL group n=210	Significant difference across categories p-value
ED $	173	284	509	0.000
(95% CI)	(134-212)	(171- 397)	(338- 680)	
APDC $	1063	1305	2323	0.082
(95% CI)	(749-1378)	(627-1982)	(1252-3394)	
PBS $				
Benefit paid	205	246	323	0.547
(95% CI)	(129-281)	(108-384)	(114-532)	
Patient OOPC	31	25	28	0.545
(95% CI)	(25-36)	(16-33)	(16-40)	
MBS $				
Benefit paid	397	407	346	0.768
(95% CI)	(324-470)	(249-564)	(217-474)	
Patient OOPC	66	39	47	0.349
(95% CI)	(42-89)	(13-66)	(-32-126)	
Totals $				
Grand total	1934	2305	3575	0.046
(95% CI)	(1526-2342)	(1395-3216)	(2329-4822)	
Total less OOPC	1838	2241	3501	0.039
(95% CI)	(1442-2234)	(1348-3134)	(2261-4740)	

Note: total n = 2500 = 10 quarters of observations for 250 individuals who either screened positive for D&A problems or saw CL during the 2.5 year observation period; OOPC = out-of-pocket costs

When average total costs per quarter for people with D&A problems are split by ASSIST screen and CL status, reported in Table 4.67 above, significant differences are evident. The type of D&A patients who are seen by CL are those who cost more, on average. The regression analyses will explore whether costs for this group differ before and after the intervention.

Part 3: Regression analysis

The regression analyses that follow investigate whether, controlling for other factors, health care costs for people who receive CL decrease after the intervention, relative to people with an intensive intervention need who did not receive CL. The "difference-in-difference" approach controls for differences between the CL group and comparison group.

Average total health care cost per person

The random effects regression analysis of predicted total health care cost (ED+AP+MBS+PBS) was undertaken at a patient level, predicting the average cost per person per quarter over the 2.5 year observation period. The results for the coefficients of interest are presented in Table 4.68.

Table 4.68 Random effects regression analysis of total health care costs per patient per quarter

	Base case	Relative to base case		
Variable	**No D&A problem**	**ASSIST brief, no CL**	**ASSIST intense, no CL**	**Received CL**
Start of the observation period	-	158.49	629.42	17.16
Time trend	314.44***	-30.03	-45.43	270.25
Shift after the intervention period	-635.20	414.44	-53.08	2979.05*
Change in time trend after intervention period	-579.90***	-238.83	262.35	-946.44*

Notes: Results are reported as the coefficient. n=6740 represents 10 quarters of observations for 674 individuals. Also controlled for patient characteristics, time of survey and hospital where surveyed.
****, **, * = significant at 1%, 5% and 10% levels respectively.*

At the start of the observation period there is no significant difference in total costs between patient groups. There is an increasing trend in costs over time of $314.44 (p=0.000). Following the intervention period, the trend over time decreases for patients without D&A problems. There is no significant difference (at the 5% level) in this change in time trend for the D&A patient groups, although for people who saw the CL service the estimated additional decrease in trend over time of –946.44 is very close to being significant (p=0.051).

Average total health care cost per person, excluding patient out-of-pocket costs

The random effects regression analysis of predicted total health care cost, excluding patient out-of-pocket costs, was undertaken at a patient level, predicting the average cost per person per quarter over the 2.5 year observation period. The results for the coefficients of interest are presented in Table 4.69.

Table 4.69 Random effects regression analysis of total health care costs per patient per quarter, excluding out-of-pocket costs

	Base case	Relative to base case		
Variable	**No D&A problem**	**ASSIST brief, no CL**	**ASSIST intense, no CL**	**Received CL**
Start of the observation period	-	152.70	614.44	-1.94
Time trend	292.60***	-17.27	-21.11	275.51
Shift after the intervention period	-528.62	307.74	-149.17	2988.86*
Change in time trend after intervention period	-563.73***	-225.48	227.81	-956.18**

Notes: Results are reported as the coefficient. n=6740 represents 10 quarters of observations for 674 individuals. Also controlled for patient characteristics, time of survey and hospital where surveyed.
****, **, * = significant at 1%, 5% and 10% levels respectively.*

The total cost results in the model that excludes patient out-of-pocket costs are very similar to the previous results. However, a notable difference is that the additional decrease in the time trend for people who saw CL is now statistically significant (p=0.043). The evidence suggests that average total cost to government decreases at an additional rate of $956.18 every quarter for each person who received a D&A CL intervention. The cumulative effect over the first year after seeing CL is $9561.80 ($956.18 in the 1st quarter, 2x$956.18 in the 2nd quarter, 3x$956.18 in the 3rd quarter, 4x$956.18 in the 4th quarter). Note that this calculation does not take into account the estimated shift in costs post intervention which was not significant for any patient group. However, for the CL group the estimated upward shift in total costs per quarter of $2988.86 is approaching significance (p=0.055). If we take this into consideration it would offset the cost savings in the first year after the intervention (4x2988.86 = 11955.44), with net savings not being realised until the second year after the intervention.

Summary and conclusions – total cost analysis

The total cost analysis indicates that CL services may result in cost savings to the health system of over $9,500 per new D&A CL client in the year following the intervention. This result should be interpreted cautiously; the effect may be delayed as there is some evidence of an initial increase in costs, in which case cost savings may not be realised until the 2nd year after the intervention.

Therefore, in the following cost benefit analysis we rely on the more conservative finding of ED cost savings of $860 per new CL client in the first year after the intervention, as reported in part 3 of Section 4.4.

Section 5. Estimated cost and consequences of NSW D&A CL services

To estimate the cost of providing CL services (irrespective of whether or not they were fully or partially funded through enhanced funding) a questionnaire was sent to the Directors of Drug and Alcohol Services at each of the 8 sites in the evaluation.

Responses were received from 5 sites. Based on these, we derived the following cost of CL per new patient seen by the service.

Table 5.1 Cost of providing CL services

	Average annual cost of providing CL $			Number of new patients per annum	Average cost per new patient $
Hospital	**Staff**	**Consumables**	**Total**		
Albury	109,828	4,758	114,586	80	1432
Campbelltown	180,000	20,000	200,000	422	474
John Hunter	609,592	14,886	624,478	936	667
Royal Prince Alfred	340,000	10,000	350,000	716	489
Wollongong	84,750	5750	90,500	405	223
Overall average				**512**	**657**

Overall, the average cost of CL per new client is estimated at $657. The average number of new clients per annum is 512.

This compares to estimated ED cost savings for patients who received CL of $860 in the first year following the intervention. Based on this conservative estimate CL is expected to result in net savings to NSW Health of $203 ($860 - $657) per new CL client in the first year. On average this amounts to an estimated net benefit of **$103,936 per annum per site using our most conservative findings.**

Other positive benefits of CL not expressed in dollars are listed below. Based on the regression results CL may:

- prevent an increase in average LOS in ED over time
- prevent a worsening in emergency admission performance (observed for the ASSIST intensive need group but not for the CL group in the post intervention period)
- have a delayed impact on frequency of presentations, which eventually decrease for people who received CL relative to the comparison group

- decrease the rate of admissions over time
- increase the uptake of selected PBS drugs and associated costs but with no overall increase in PBS costs

Evidence from the aggregate hospital data analysis which focussed on hospital outcomes over time before and after enhanced funding was introduced also suggested benefits at some hospitals from enhanced funding. It is important to note that most hospitals had some degree of CL service prior to receiving enhanced funding and therefore these outcomes are conservative as, rather than reflecting the full impact of CL, they demonstrate the possible impact of additional funding and therefore depend on how this funding changed the service.

The introduction of enhanced funding may have:

- decreased the rate D&A admissions at 5 (out of 12) hospitals
- reduced the rate of incidents at 9 (out of 12) hospitals

Overall the results of the economic evaluation provide evidence that the provision of D&A CL services in NSW hospitals is cost saving.

Section 6. Conclusions

Previous research demonstrates that drug and alcohol (D&A) morbidity is common among patients presenting to hospitals, yet frequently unidentified. D&A morbidity can affect post-operative morbidity, behavioural incidents, readmissions and re-injury. The provision of D&A CL services may improve identification of patients with D&A problems, improving health outcomes through appropriate treatment and referral to services thereby reducing re-presentation and admission rates and length of stay in hospital. This is not only expected to benefit patients with underlying D&A problems but may reduce costs to the health system.

Most NSW hospitals have some form of CL services and since 2007 a number of hospitals have received dedicated funding for the provision of enhanced D&A CL services, with the aim of improving hospital performance indicators and health outcomes. The aim of this evaluation was to estimate the prevalence of D&A morbidity and patterns of use amongst patients presenting to hospital in NSW; to determine whether D&A CL services in NSW hospitals improve health outcomes and hospital performance indicators; and to estimate the cost and consequences of providing the service.

Study 1, the patient survey, provides evidence of the prevalence of D&A morbidity in patients presenting to EDs in NSW hospitals and the extent to which this is a contributing factor to presentations. Using the ASSIST screening tool, 35% of patients in the baseline survey screened positive for D&A problems (excluding tobacco) with 7% requiring intensive treatment for one or more substances. 12% of the total sample screened positive for problematic substance use for two or more substances. Substances most commonly used in the past 24 hours were alcohol (27%), sedatives (5%) and opioids and cannabis (both 4%). Substances most commonly reported by respondents as contributing to their presentation were alcohol (18%), cannabis (4%) and sedatives (3%). Tobacco was also reported as contributing to their presentation by 12% of respondents. Despite the high prevalence of D&A problems amongst ED patients, the 3 month follow-up study indicated that only 8% of patients with D&A problems recalled being referred to D&A services by hospital staff, whilst 15% had accessed D&A services since baseline. These results are based on a small sample so should be interpreted cautiously but it does suggest that only a minority of patients with D&A problems who present to ED are referred for treatment.

Study 2 Part 1 analysed hospital level data with a focus on the timing of the introduction of enhanced funding of D&A CL services at 12 hospitals and used interrupted time series analysis to identify whether enhanced funding made a difference to hospital indicators over time.

The hospital level ED data demonstrates that only a small proportion of patients receive a D&A diagnosis as their primary diagnosis (less than 1% on average), the majority of which are for "mental and behavioural problems related to alcohol use". The small proportion of D&A diagnoses is not unexpected as D&A may not be the main reason for presenting, even if it is a contributing factor. Nevertheless it demonstrates the need for an alternative method of identification of patients with D&A problems given the evidence from Study 1 of the high prevalence of D&A morbidity.

The hospital level analysis of inpatient data (APDC) found significant differences in the percentage of separations with a primary or additional D&A diagnosis in 8 out of 12 hospitals following commencement of enhanced funding. For 5 of these there was a statistically significant decrease in D&A presentations (suggesting that enhanced funding may have reduced repeat presentations), whilst for 3 an increase was evident (which may indicate that patients with D&A problems were more likely to receive a D&A diagnosis or may reflect an actual increase in D&A presentations).

Hospital level analysis of IIMS data examined trends in incident types where D&A issues were most likely to be represented, including Total Clinical Incidents, Behavioural Type Clinical Incidents, Total Complaint Incidents and Total Property Security and Hazard Incidents. Statistically significant decreases since the commencement of ECL were found at 9 out of 12 hospitals for at least one of the four incident types analysed. The evidence was greatest at RPA, in which all 4 incident types exhibited a significant decrease following the introduction of ECL.

Differences in the results for different hospitals in the aggregate hospital data analyses may reflect differences in how enhanced funding is used.

Study 2 Part 2 analysed patient level EDIS, APDC and CL data over time for a subsample of patients from Study 1 who consented to NSW Health record data extraction and who provided sufficient information to facilitate data linkage. For those patients who also provided consent for Medicare data extraction, analysis of MBS and/or PBS data was also undertaken. The data covered the period from 18 months prior to the patient survey to 12 months post the survey.

10% of people in Study 2 who screened positive in the survey for D&A problems received a D&A CL intervention during the evaluation period. The majority of these screened in the survey as requiring an intensive intervention, indicating that CL services are capturing D&A patients with the highest level of need. However, the CL sample only reflects approximately a quarter of patients with an intensive intervention need which suggests scope for expanding the delivery of D&A CL services and improving the identification of patients with D&A problems.

Each data set in the patient level analysis was analysed in 3 parts: Part 1 compared outcomes for patients by level of D&A need based on the ASSIST tool used in the survey. Part 2 compared those patients who saw CL at some time during the evaluation period (18 months prior to 12 months post the survey) with those who screened positive as requiring a brief or intensive intervention but who did not see CL, to investigate the type of patients seen by CL and determine an appropriate comparison group for the evaluation. In Part 3 interrupted time series regression analysis of key indicators was undertaken to compare changes over time between the CL group and comparison group following the intervention, to estimate the impact of receiving a D&A CL intervention. The key findings for each data set are summarised below.

ED data analysis

Part 1: The type of presentation differs for people who screened in the survey as needing an intensive intervention. This group is more likely to arrive by ambulance, public transport or police/correctional services vehicle and is more likely to present in the afternoon or slightly later in the evening than other patients. The evidence also suggests that compared to other patients, presentations for people who screened as needing an intensive intervention are more likely to leave at their own risk or not to wait. People identified as requiring an intensive intervention presented twice as often as people who screened negative for D&A problems with an associated ED cost of $177 more per quarter than those without D&A problems.

Part 2: Patients who received CL at some stage during the 2.5 year observation period are similar to those who screened as requiring an intensive intervention but were not seen by CL. Both of these patient groups presented more frequently than people who screened as requiring only a brief intervention and were more likely to leave the ED without waiting. This suggests that the intensive need (no CL) group are an appropriate comparison group for the evaluation. However, the CL group appear to be more costly than those requiring an intensive intervention but who did not see CL

during the observation period, indicating the need to control for baseline differences in the regression analyses.

Part 3: The ED regression results indicate that CL services may prevent an increase in average LOS in ED over time and prevent a worsening in EAP in subsequent presentations. There is also evidence of a delayed impact of CL on frequency of presentations, which eventually decreases for people who received CL relative to the comparison group. The estimated ED cost savings for patients who received CL relative to the control group is $860.40 in the first year following the intervention.

APDC data analysis

Part 1: People who screened as needing an intensive intervention are more likely to be admitted to a psychiatric ward during their stay. Furthermore, once admitted to a psychiatric ward they have a longer length of stay in the ward. The evidence also suggests that admissions for people who screened as needing an intensive intervention may have a longer total length of stay compared to those who screened negative.

Part 2: Point estimates revealed some differences between admissions for the CL group and people who screened positive but who did not see CL during the evaluation. However, the only statistically significant differences were for average length of stay and frequency of admissions for the CL group compared to those screened as needing a brief intervention who were not referred to CL during the observation period.

Part 3: The regression results indicate that CL services may decrease the rate of admissions over time relative to the comparison group. The regression results did not provide any evidence of an impact of CL on costs relating to admissions over the period of the evaluation.

PBS data analysis

Part 1: There is no significant difference by ASSIST D&A screen status in total scripts per patient per quarter. However, when we examined the subset of scripts for selected ATC codes which are likely to be related to D&A problems, people who screened positive have more of the selected scripts per quarter than those who screened negative. Pairwise comparisons also showed a significant difference between the net benefit paid (cost to government) for the selected PBS items for people requiring an intensive intervention ($166.73) compared to those requiring a brief intervention ($62.95). People who screened positive for opioids have significantly more prescriptions, for all items and for the selected PBS items, than other people with D&A problems. For the selected ATC

codes, the net benefit paid is $154 higher for people who screened positive for opioids than for other people with D&A problems.

Part 2: The number of selected scripts for the CL group and those with intensive intervention need, who did not see CL, are not significantly different from each other. Similarly, net PBS benefit for people who needed an intense intervention (no CL) and for those in the CL group are both significantly different from that for people needing a brief intervention, whilst the difference between the intensive need group and the CL group was not significant. This supports the use of the group who screened as needing an intensive intervention as a comparison group in the regression analyses in part 3.

Part 3: For people who were referred to CL relative to those in need of an intensive intervention who did not receive CL, there is evidence of an increase in selected PBS scripts after being seen by the CL service, equating to $893.60 in the year after the intervention. This cost increase may reflect appropriate use of health care services and should not be interpreted as a negative impact of CL. Moreover when we considered all scripts, there is no longer a significant difference in costs, suggesting that the increase in cost of selected scripts may be offset by a decrease in others.

MBS data analysis

Part 1: people who screened positive or negative for D&A problems used a similar number of MBS services; however, those who screened positive paid significantly lower out-of-pocket expenses for MBS services. The total net benefit (cost to government) did not vary significantly by ASSIST screen. However, for selected MBS items, people who screened positive had a significantly higher net benefit than those who screened negative.

Part 2: utilisation of MBS services was similar amongst those that saw CL and those that screened positive, requiring an intensive intervention.

Part 3: For people who saw CL, the regression results do not provide any evidence of a change in uptake of MBS services due to the intervention.

Total cost analysis

For a subsample of people who consented to NSW Health and MBS and PBS data extraction, a combined analysis was also undertaken investigating the impact of CL on total costs per patient. The

total cost analysis indicates that CL services *may* result in cost savings to the health system of up to approximately $9562 per new D&A CL client in the year following the intervention. This result should be interpreted cautiously as there may be a delayed effect; there is some evidence of an initial increase in costs, in which case cost savings may not be realised until the 2nd year after the intervention.

Study 2 Part 3 estimated the overall cost and consequences of CL. D&A CL budget and service provision information provided by Directors of D&A Services was used to estimate the cost of providing CL and was compared to the outcomes from the evaluation. Overall, the average cost of CL per new client is estimated at $657. Comparing this to the cost savings in ED of $860, CL is expected to result in net savings to NSW Health of $203 ($860 - $657) per new CL client in the first year following the intervention.

Multiplying the predicted net benefit per CL client ($203) by the average number of clients per hospital (512) amounts to an estimated **net benefit of $103,936 per annum per site** using our most conservative findings. In addition to this our results indicate that CL may:

- prevent an increase in average LOS in ED over time
- prevent a worsening in emergency admission performance (observed for the ASSIST intensive need group but not for the CL group in the post intervention period)
- have a delayed impact on frequency of presentations, which eventually decrease for people who received CL relative to the comparison group
- decrease the rate of admissions over time
- increase the uptake of selected PBS drugs and associated costs but with no overall increase in PBS costs

The introduction of enhanced funding may have:

- decreased the rate of D&A admissions at 5 (out of 12) hospitals
- reduced the rate of incidents at 9 (out of 12) hospitals

There are a number of caveats to the evaluation:

The aggregate hospital data analysis is limited by the fact that D&A patients could only be identified by diagnosis and represent only a small proportion of people with D&A problems. Furthermore most hospitals had some degree of CL service prior to the provision of enhanced funding and therefore the results at each hospital may only reflect the degree to which the funding altered the service rather than the impact of CL.

Whilst reflective of the extent of CL service provision, the small CL sample limited the ability for follow-up survey to investigate differences in referral patterns for CL patients compared to those with D&A problems who did not see CL. Study 2 attempted to investigate this using ED and APDC referrals data; however the results were inconclusive.

The study is also limited by relying on observational data rather than randomised trial data. However, the descriptive comparisons indicated the intensive need (no CL) group as an appropriate comparison group for the evaluation. Our models also control for confounding effects and include a proxy intervention time for the non-CL patient groups to control for other possible changes (such as policy changes) which may impact on changes in outcomes over time for other patients.

Final conclusion

Despite the limitations noted above, overall the results of the economic evaluation provide evidence that the provision of D&A CL services in NSW hospitals is cost saving. This finding is based on our most conservative estimates.

References

Australian Institute of Health and Welfare. (2012). Australian hospital statistics 2011-12: Emergency department care. Health services series no.45. Cat. No. HSE126. Canberra: AIHW

Australian Institute of Health and Welfare. (2013). Health expenditure Australia 2011–12. Health and welfare expenditure series no. 50. Cat. no. HWE 59. Canberra: AIHW.

Centre for Drug and Alcohol (April 2005 draft). A State-wide Plan for Drug and Alcohol Consultation Liaison Services in Acute Care Settings. NSW Department of Health

Conigrave, K., Burns, F., Reznik R., Saunders J. (1991). Problem drinking in emergency department patients: the scope for early intervention. Medical Journal of Australia. 154(12): 801-805.

Demand and Performance Evaluation Branch, Health Systems Quality, Performance and Innovation Division, NSW Health (2010) Key Performance Indicator Dictionary for the 2010/11 Area Health Service Performance Agreements, Version 1

Indig, D., Copeland, J., Conigrave, K., Rotenko, I. (2008). Why are alcohol-related emergency department presentations under-detected? An exploratory study using nursing triage text. Drug and Alcohol Review, 27(6):584-590.

Indig, D., Copeland, J., Conigrave, K., Arcuri, A. (2010). Characteristics and comorbidity of drug and alcohol-related emergency department presentations detected by nursing triage text. Addiction, 105(5):897-906.

Lloyd, B., Matthews, S., Livingston, M, Jayasekara, H. (2011). Drinking cultures and social occasions: Alcohol harms in the context of major public holidays and cultural events. Turning Point Alcohol and Drug Centre. Accessed at: http://www.vichealth.vic.gov.au/~/media/ResourceCentre/PublicationsandResources/alcohol%20misuse/Drinking-Cultures-Social-Occasions-Report_public%20holiday.ashx

NSW Health, Emergency Department Data Dictionary, Version 4

NSW Health (2011) NSW Costs of Care Standards 2009-2010

NSW Health (2010) MHDAO Project Plan for Evaluation of Drug and Alcohol Consultation Services, July 2010

Rostenberg, P. (1995). Alcohol and other drug screening of hospitalized trauma patients. Rockville, MD: Substance Abuse and Mental Health Services Administration, Center for Substance Abuse Treatment, Treatment Improvement, Protocol #16.

Saunders, J. (2009). A Brief History of the Development of Consultation-Liaison Services in Alcohol and Drugs in New South Wales. NSW Department of Health

Shourie, S., Conigrave, K., Proude, E., Haber, P. (2007). Detection of and intervention for excessive alcohol and tobacco use among adult hospital in-patients. Drug and Alcohol Review. 26(2):127-133.

Tonnesen H. (2003) Alcohol abuse and postoperative morbidity. Dan Med Bull. 50(2):139–160.