Report to the
Alcohol Education and Rehabilitation Foundation

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Final Report

Reducing Morbidity Among Licit Substance Using Adolescents: A Record Linkage Assessment of a Brief Intervention

Objectives

1. To validate the use of hospital record linkage procedures as a method of collecting follow-up data and to use this methodology to assemble outcome data on the study cohort;
2. To investigate the use of brief interventions with licit substance using adolescents and analyse hospital morbidity over 12-months;
3. To investigate differences in the type of licit substances used by male and female adolescents and also potential differences between single versus poly substance users.

Overview

The project followed-up a subset of the participants who enrolled in an earlier randomised controlled trial. The participants in the baseline study were adolescents who attended hospital emergency departments with conditions related to alcohol or other drug use. The cohort to be followed-up were those people who presented with conditions related to alcohol, other licit drugs or a combination of licit substances with illicit substances. The methodology for the study was detailed in the original proposal. In brief, we used the Western Australian Data Linkage System (WA Linked Database) to assemble data on hospital presentations pre and post intervention for the eligible participants. Emergency department presentations that are treated and discharged from ED, do not constitute formal hospital admissions, and are not in the WA Linked Database. Therefore, further data were accessed from the Emergency Care Hospitalisation and Outcome Study (ECHO) on presentations to the emergency department that did not result in hospital admissions. These data were assembled from the Emergency Department Information Systems (EDlS) used in the major teaching hospitals in Perth.

Assumptions

In the baseline study, there was considerable "loss to follow-up" or attrition of participants. At 12- months post-intervention, only 69% of participants agreed to be re-interviewed. It could be argued that those with the "worst" outcomes are less likely to agree to be interviewed, hence biasing the outcomes of the research. However, by using the WA Linked Database, the authors were able to obtain data on 100% of participants. We asserted in the proposal that attrition would not be linked to treatment group and missing or incomplete data should only occur for the small proportion of people who leave Western Australia. In addition, this approach to data collection should be less prone to the subjective biases associated with personal interviews. However, because data were available for all participants, we are unable to draw any conclusions with respect to missing participants for future studies other than re-iterating our original claims that the WA Linked Database has many advantages in assessing health outcomes in longitudinal research. Obviously, the type of data available via record linkage is limited to that routinely collected by hospitals. Other data will still require conventional follow-up.

The work undertaken by this project was only possible because of the existence of the unique research infrastructure in Western Australia.

Modifications to the research methodology

There were no modifications made to the research methodology as outlined in the study protocol submitted with the grant application.

An interpretation of the effectiveness of the research methodology

The methodology, whereby the WA Data Linkage System was to be used to assemble follow-up data on participants, was selected as the chief investigators had previously demonstrated its effectiveness in a similar "hard to retain" population. In the mid-1990's the first investigator coordinated an intervention to reduce hazardous/harmful levels of alcohol consumption among general psychiatric ward patients.

The study compared a motivational intervention with an information pack. Whilst the motivational intervention was successful in producing a significantly greater reduction in alcohol consumption than an information pack (Hulse & Tait 2002), there was considerable attrition of participants. At six months 69% were re-interviewed, at l2-month 53% contributed data and only 46% could be contacted at l8-months. However, five-year follow-up of the same cohort using the WA Linked Database was able to assemble data on 98% of the cohort (Hulse & Tait 2003). In addition, the WA Linked Database has been used in a range of other health related assessments (Patterson et al. 1999; Valinsky et al. 1999; Lawrence et al. 2003). The core data sets in the Data Linkage System have been well validated, and used in assembling data on similar "hard to retain" groups thus this aspect did not require re-validating.

However, the ED data has yet to be rigorously evaluated. The ECHO project has coordinated the assembly of ED data from hospitals in Western Australia and has produced an internal report on the validity of the data (Sprivulis et al. 2003). However, no peer-reviewed publications were available at the start of the study. Therefore, one of the objectives of the current study was to validate the electronic data against paper hospital records. Towards this end, we reviewed hospital records at three of the main hospitals in Perth.

Validation of ED data

Of the original 127 participants, 74 were enrolled at hospitals covered by the electronic system. The two validation data sets were restricted to cover the same hospitals and time period (1-7-2000 to 23-6-2003).

The manual data review identified 211 presentations by 72 adolescents including two individuals with no presentations during the validation period. We were unable to access files at the index hospital for the remaining two cases and they were not identified at other hospitals. The manual search also identified eight arrivals that were more recent than the most recent electronic data (i.e. after 23-6-2003).

The electronic data contained 287 presentations by 71 individuals -leaving three individuals who could not be matched. An inspection of the databases revealed three events in the manual dataset that were not recorded in the electronic set, one of these being a person who did not wait for a medical examination and was just logged at triage. We concluded that the electronic data set gave a more complete account of ED events so this was used as the primary source. However, it should be emphasised for the purposes of the

current study, these data were supplemented with manually collected data from study hospitals that were not in the in the EDIS system and for events prior to 1-7-2000.

Conclusion:

Data collection via the EDIS system provided a more complete data set than manual data collection. Manual extraction of information from hospital records is a labour intensive process which can be replaced by electronic extraction of information for most studies. Manual extraction may be justified when data are required on a small sample and particularly when the most update- information is essential.

The manuscript accepted by Drug and Alcohol Dependence will be the first publication using data from the ECHO project and validating the EDIS data (personal communication from Dr Peter Sprivulis, ECHO project).

Relevant statistical data that reflects the objectives of the project

An initial analysis of the data resulted in a poster presentation at the Australasian Professional Society on Alcohol and other Drugs 2004 Conference. (An A4 reproduction of the poster has already been supplied). Subsequently, a manuscript on the project was accepted by Drug and Alcohol Dependence (a copy of the uncorrected proof is included for your inspection: a final copy of the paper will be supplied when it is available).

The supplied manuscript details the outcomes for the entire baseline cohort: this report focuses on those using licit substances, in particular alcohol. The average age was 16.6 (SD 1.8) with 58 males and 52 (47%) females.

Table 1 shows a cross tabulation of the substances used by gender: the profile of substance use was remarkably similar for males and females (χ^2 0.43 (3) p=.933). Alcohol was the main substance reported at the baseline emergency department presentation (61 %), and in only 12 (11%) cases was alcohol not reported either alone or in conjunction with another drug.

Table 1. Substances used at index admission sub-divided by gender.

Substance	Males	Females
Alcohol	36 (54)	31 (46)
Alcohol + legal	7 (58)	5 (42)
Alcohol + illicit ± legal	9 (47)	10 (53)
Other legal	6 (50)	6 (50)

Legal substances = misuse of prescription or over the counter medicines or other substances (e.g. inhalants)

In the 12-months pre-index there were 140 hospital events of which 52 (37%) were related to substance use. In the 12-months post-index there were 150 events with 56 (37%) being substance related. Those who received the brief intervention had more hospital events in this period that the usual care group (Mann Whitney U 2.97 p=.003). In the 12-months before index the 33 (58%) of the usual care and 28 (53%) of the intervention group had no hospital events. Further, it was also noted that 39 (35%) people no hospital events in the 24 month review period other than their index presentation: substance use category was not related to whether or not they had one or more presentations in this time (χ^2 3.12 (3) p=.313).

Survival to first alcohol or other drug event

Figures 1a and 1b show the "survival" times to first hospital event involving alcohol or other drugs (AOD) for the usual care and intervention groups. The substances used have been regrouped as alcohol alone versus all other drug categories. In the intervention group, the outcomes were similar for both drug categories whilst those who received usual care had significantly shorter survival times for those who used "all other drugs" than those who used "alcohol alone" (Log Rank Test 6.1 (1) p=.0 135).

To adjust for differences in baseline factors, a Cox Regression analysis was conducted that included four variables: age, sex, number of AOD hospital events in the 12-months pre recruitment and drug category ('alcohol alone', 'alcohol plus', 'other drugs') stratified by study group. (One outlying case was excluded). Table 2 shows the results of the analysis. In the usual care group, after adjusting for these variables, the number of AOD events in the 12-month pre-recruitment was a significant predictor and the drugs identified at recruitment approached significance. Each pre-index AOD event increased the hazard of a subsequent AOD event by over 2½ times. Compared to the use of 'alcohol alone', the use of 'other drugs' appeared to increase the hazard of incurring an AOD event, but the wide confidence intervals meant that this did not reach statistical significance. A similar picture was obtained for the intervention group.

Figure 1a & 1b. "Survival" to first alcohol or other drug (AOD) event for each group.

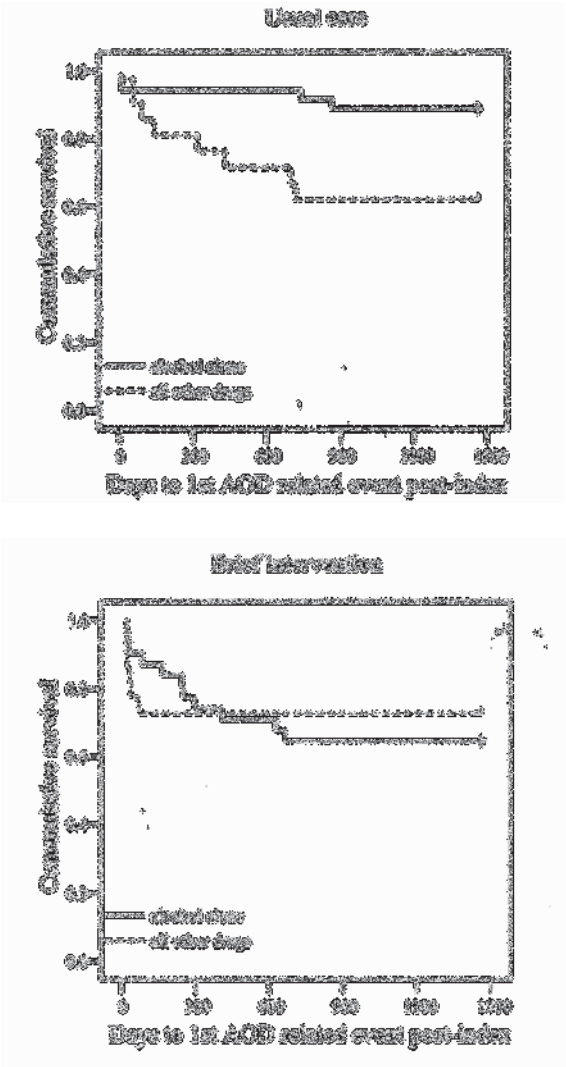

Table 2. Cox regression analysis of study variables on survival time to AOD related hospital admission or emergency department presentation stratified by study group.

		Beta	SE	Wald	DF	*P*	Hazard (95% CI)
Usual Care group							
Age		-.07	.19	.12	1	.729	0.94 (0.64-1.37)
Sex		.22	.71	.09	1	.759	1.24 (0.31-4.97)
AOD events 12 month pre index		1.02	.32	10.08	1	.002	2.77 (1.48-5.20)
Drug category	co-alcohol	-.73	1.10	.43	1	.514	0.48 (0.05-4.29)
	other drugs	1.46	.80	3.32	1	.068	4.32 (0.90-20.8)
Intervention group							
Age		.32	.20	2.56	1	.110	1.38 (0.93-2.04)
Sex		.96	.60	2.52	1	.112	2.62 (0.80-8.56)
AOD events 12 month pre index		.72	.29	6.33	1	.012	2.05 (1.17-3.59)
Drug category	co-alcohol	-1.14	.70	2.64	1	.104	0.32 (0.08-1.26)
	other drugs	1.32	.68	3.78	1	.052	3.76 (0.99-14.3)

AOD = alcohol or other drugs: co-alcohol = alcohol plus illicit ± licit drugs.
Drug category reference group = 'alcohol alone'

Conclusions

Data on the entire cohort (n=127) showed that the intervention was of particular benefit to illicit drug users. Given that those who just used illicit drugs were excluded from this report, it is not surprising that the intervention had little impact in the remaining adolescents. We also noted that over ⅓rd of the cohort only had one hospital event (index event) during the two year review period, thereby reducing any potential benefit of the intervention.

The main predictor of re-admissions with alcohol or other drug events was having incurred one previously. Therefore, those with a history of AOD events should be targeted for more intensive intervention when they present to hospital ED. The inclusion of a question on hospital events involving drug use should be investigated as part of screening questionnaire for this age-group. This would enable interventions to be delivered in other settings such as schools and by GPs. Also identified as a potential predictor for re-admission was the use of other licit substances, such as inhalants or prescription medication, thus adolescents presenting with this type of substance use may also benefit from more intensive treatment.

No gender differences were identified in this study nor were there differences between users of alcohol alone and those who co-used alcohol with other substances.

Dissemination Plan

As noted above, the initial outcomes were presented at the 2004 annual conference of the Australasian Professional Society on Alcohol and other Drugs and a manuscript on the final outcomes has been accepted for publication by *Drug and Alcohol Dependence*. Professor Hulse co-ordinates alcohol and drug education in the Faculty of Medicine, UWA and is therefore, in a position to include relevant information within the undergraduate

medical curriculum. He is also Chairperson of Committee for Alcohol and Drug Education in Australian and New Zealand Medical Schools (CADEMS).

Promotional Material

As the study used the WA Linked Database to assemble study data and did not recruit or contact patients, no promotional material was required for this study.

Published Papers

Tait, R. J. and Hulse, G. K. (2005) Adolescent substance use and hospital presentations: A record linkage assessment of 12-month outcomes. *Drug and Alcohol Dependence*, 79, 365-371.

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