Factors Affecting the Short-Term Prognosis of Alcohol Dependent Patients Undergoing Inpatient Detoxification

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Abstract

 Stable measures of psychological functioning require a considerable period of abstinence. However, the duration of inpatient detoxification programmes has decreased dramatically in most health care systems, posing a novel challenge for clinical evaluation of patients. The present study was carried out to examine whether factors predicting short-term prognosis can be identified in alcohol dependent subjects during early stages of inpatient detoxification. Self reports of mood states were obtained, and executive cognitive functioning was examined. Outcome was studied at two months. No correlation was found between self-reported symptoms of depression, hopelessness, and anxiety, and percentage of non-drinking days. A significant positive correlation was found between Wisconsin Card Sorting Test (WCST) performance and short-term prognosis measured by this parameter. Thus, in addition to transient withdrawal-related effects, impairments of WCST performance in early stages of alcohol detoxification may reflect more long standing deficits in problem solving strategies, of possible relevance for matching patients to treatment services.

Keywords: alcohol dependency; mood states; motivation; cognitive functioning; WCST.

1. Introduction

Severely alcohol dependent patients with frequent hospitalisation episodes because of somatic and psychiatric complications   alcohol misuse pose a special challenge to clinicians. Despite the harmful and distressing consequences of their drinking behaviour compliance with treatment programmes is poor, and more often than not these patients are difficult to motivate for follow-up sessions. In addition, a sufficiently long period of sobriety for proper evaluation of possibly important symptoms and neuropsychological testing is seldom attained in these patients. Thus, little is known about factors that may be important for the outcome, and treatment plans cannot be made with reference to the status of the individual patients.

Previous studies performed after one or two months of abstinence in different groups of alcohol dependent patients have suggested that a number of factors, such as depressive symptoms, motivation and cognitive performance, may in different ways affect the maintenance of sobriety.

A high comorbidity between alcoholism and other psychiatric disorders has long since been established (Regier et al., 1990), and some studies indicate that a co-morbid psychiatric disorder will increase the severity of both disorders (Sheehan, 1993). Anxiety and affective disorders have been found to account for a large percentage of comorbidity. Among alcohol misusers, 30% to 44% display anxiety or anxious / depressive symptoms (Tollefson, 1991). In one study anxiety disorders and affective disorders accounted for 62% and 34% of comorbidity respectively (Ross and Germanson, 1988). Depression has been reported as the best single predictor of relapse in some studies (Glenn and Parsons, 1991) whilst no correlation has been found in others (Sellman and Joyce 1996). Symptoms of depression and anxiety in alcohol dependent individuals usually decline after two to three weeks of abstinence (Brown and Schuckit 1988) but it is not clear if there is a correlation between degree of symptoms during detoxification and symptomatology after a period of sobriety.

It would not be unreasonable to suppose an association between the presence of symptoms of depression and anxiety and low motivation to change alcohol drinking behaviour. However, patients in the contemplation/action stages of motivation have reported greater symptoms of depression and anxiety than those in the precontemplation stage (Willoughby and Edens, 1996), suggesting that motivational level may not be coupled to mood disorders. The importance of high motivation has been demonstrated by Isenhart (1997) who found a relationship between pre-treatment readiness for change and both the decision to abstain from alcohol and to engage in recovery activities. However, even the highly motivated patient, being in the action stage and actively trying to change drinking behaviour, may not be successful.

Intact cognitive functions appear to be essential for a favourable outcome (Allen et al., 1997). Smith and McGrady (1991) found a positive correlation between aftercare attendance and higher neuropsychological functioning, although such an association has not been possible to demonstrate in other studies (Eckhardt, 1988). It has been reported that between 50 and 80% of patients with alcohol dependence exhibit cognitive decline (Parsons, 1993). Executive cognitive functioning (ECF), i.e. the ability to initiate, develop and maintain an appropriate problem-solving strategy across changing stimulus conditions in order to achieve a future goal (Luria, 1973; Shallice, 1982), may be of particular relevance to the alcohol-dependent patient, as a deficit in this area of

cognitive functioning may well limit the patient's ability to participate in and profit from the usual forms of post-detoxification treatment. Several studies have indicated that ECF may be impaired in chronic alcoholism (Eckhardt 1988).

In the present study a group of severely alcohol dependent patients was assessed during in-patient detoxification. The primary goal was to study if the degree of depressive symptoms, motivational level and cognitive functioning could predict alcohol consumption after discharge from hospital until follow-up approximately two months later. We also studied the change in the studied parameters between the two assessments and whether any correlations existed between the scores at the initial assessment and at follow-up.

2. Method

2.1 Subjects

The study was undertaken with the approval of the Southern Stockholm Human Subjects Ethics Committee. Participants were recruited from a hospital alcohol detoxification ward where the primary criteria for admittance were not only severe alcohol dependence, but also previous complications during detoxification, such as delirium tremens or epileptic seizures. Twenty-nine consecutively admitted patients, both male and female, who had received inpatient detoxification treatment on the ward at least twice during the past 12 months were approached. The average stay on the ward was 4.6 and oxazepam was used as the primary detoxification medication. The median intake of oxazepam during detoxification was 45 mg (range 0-75) for those patients who completed the follow-up, and 30 mg (range 0-75) for those who dropped out of the study at follow-up. All the patients included in the present study fulfilled sufficient criteria for a DSM-IV alcohol dependency diagnosis (American Psychiatric Association, 1994). The Alcohol Use Inventory-Revised (AUI-R) was used to further characterise the patients (Berglund, 1986; Berglund, 1988). The AUI -R is a self-rating questionnaire comprising 89 questions resulting in an alcohol use profile. The profile consists of five sub-scales: degree of alcohol dependency (ADS); psychological benefits of drinking (PSY); interpersonal complications (REL); social drinking (SOC), indicating whether the patient tends to drink alone or in the company of others; and a measure of daily alcohol consumption (DAILY CONS).

Twenty-seven patients completed the initial battery of questionnaires and tests whilst two left the ward prematurely without completing their detoxification treatment. Nine patients failed to attend the follow-up session leaving a total of 18 patients, (5 females), (median age 49, inter-quartile range 47-54) who participated in the entire study (Table 1). These 18 patients had a median score of 9.5 (inter-quartile range 9-10) out of a possible 10 on the Alcohol Dependence Severity subscale of the AUI.
Primary exclusion criteria were history of organic brain disorder, other primary diagnosis than alcohol dependency, injuries to the skull, inability to read the test materials, or any diagnosed major psychiatric disorder. None of the patients were suffering from major hepatic dysfunction at the time of the study.

2.2 Measures

Depression & Anxiety - The Beck Depression Inventory (BDI) (Beck et al., 1961), the Clinician's Hopelessness Scale (CHS) (Beck et al., 1989), and the Beck Anxiety Inventory (BAI) (Beck et al., 1988) were chosen as measures of depression and anxiety.

These instruments categorise the level of reported symptoms in terms of "Minimal, Mild, Moderate, and Severe".

Table 1 Patient characteristics and measurement scores during detoxification. Median (interquartile range). There were no significant differences between the two groups for any of the measured parameters.

	Patients completing the study	Dropouts
	(n =18)	(n=9)
Age	49 (47-52)	47 (44-57)
M/F	13/5	7/2
AUI-R		
ADS	9.5 (9-10)	9 (9-9)
PSY.	7 (5-8)	7 (7-7)
REL.	4.5 (2-8)	3 (2-5)
SOC.	6 (6-8)	6 (5.5-8)
DAILY CONS.	5 (4-6)	4 (4-5)
BDI	25.5 (18-30)	21 (18-27)
CHS	5.5 (4-8)	8 (4.5-11.5)
BAI	7 (4-11)	4 (3-8)
RTCQ % per stage		
Contemplation	66	78
Action	33	22
TMT	37 (34-46)	33.5 (28-43)
WCST		
% Errors	8 (2-19)	7.5 (3-13)
%Persev. Resp.	20 (2-32)	15.5 (5-34)
% Persev. Errors.	16 (3-39)	11 (2-23)
% Conceptual Resp.	7 (2-16)	6 (2-8)
No. Categories.	3 (1-4)	2.5 (1-3)

Note: Values in parentheses indicate interquartile range. There were no significant differences between the two groups for any of the measured parameters.

Motivational Stage - Prochaska & DiClementes' stages of change model was the basis for this assessment (Prochaska & DiClemente, 1986). The 12-item Readiness to Change (RTCQ) questionnaire which has been shown to have satisfactory psychometric properties (Rollnick et al., 1992) was used to ascertain the patient's current motivational stage, i.e. precontemplation (a state of unawareness of a problem or the need for change), contemplation (characterised by ambivalence and a weighing up of the pros and cons of change), and action (actual changes in behaviour currently under way).

Cognitive functioning - Trail Making Tests (TMT) A & B were selected on the basis of their sensitivity to cognitive impairments associated with chronic excessive alcohol use (Lezak, 1995) and time-efficiency.

The Wisconsin Card Sorting Test (WCST) (Berg, 1948; Grant and Berg 1948) was employed as a measure of executive functions, i.e. volition, planning, purposive action, and effective performance.

The standard administration of the WCST was used (Heaton et al. 1993). The WCST is a complex decision making task of hypothesis generation, testing and modification. It is designed to study "abstract behaviour" and "shift of set" and has earned its reputation as a measure of frontal lobe dysfunction. The WCST data is presented in the form of age- and education-corrected standard scores (Heaton et al., 1993). As the normative data for Number of Categories (NC) is only available in terms of broad categories due to the skewed nature of the distribution of this score it was decided to present NC as raw data.

Outcome Measure - Time Line Follow Back (TLFB) is a well-validated and reliable retrospective method of gathering information about drinking patterns (Sobell and Sobell, 1986).

2.3 Procedure

Prospective participants were approached on the ward by the first author and given oral and written information about the study on the second or third day after admission. It was stressed that participation was voluntary and could be terminated by the patient without risk of negative consequences. On the same day the patient completed a battery of questionnaires comprising RTCQ, BDI, CHS, BAI & AUI.

TMT A & B and the WCST were administered the following day and on the third day the patients were given feedback regarding their responses to the questionnaires and their performance on the tests. They also completed RTCQ a second time. A time was also booked for the follow-up session.

As expected, it proved to be difficult to trace all of the patients, many of whom were living in poor social and economic conditions exacerbated by the severity of their alcohol addiction. Despite great efforts over a period of several months to trace those patients who failed to keep their follow-up appointments, the drop out rate was substantial. To allow comparison between those patients who completed the study and the drop-outs, all data from the initial assessment are presented in Table 1. The two groups did not differ significantly in any of the measured variables.

Two of the nine drop-outs at follow-up were at residential alcohol treatment centres and the long distances involved precluded their further participation. Of the other seven, two were not traced, three were offered and failed to keep several further appointments, and two refused to participate in the follow-up. Post-detoxification treatment data was collected median 55.5 days (inter-quartile range 53.5-107) after discharge from the ward. Sixty-seven per cent of the patients (N=18) who had originally agreed to participate and who completed the initial phase of the study attended the follow-up session.

TLFB was used at follow-up in order to ascertain the number of non-drinking days. RTCQ, BDI, CHS & BAI were completed once again and TMT A & B and WCST were administered. The patient was invited back for a further session in which he/she received feedback regarding their responses/performance at follow-up.

2.4 Statistical Methods

Median values and inter-quartile ranges are used throughout unless otherwise stated. The Spearman rank-correlation coefficient was used to identify significant correlations between observations.

The Wilcoxon signed-rank test was employed in order to address the question of whether there was a difference between the initial testing on the ward and that at follow-up.

In order to compare the patient group in this study with both patients with focal frontal lobe lesions and normal controls it was decided to use the data from the standardisation sample of the WCST (Axelrod et al., 1996). The sign test was used in order to make these comparisons.

3. Results

As may be seen in Table 1, patients who dropped out of the study at follow-up (n=11) did not differ significantly from those completing the study in age, severity of alcohol dependence, motivational level, depression, anxiety, or neuropsychological performance at the initial assessment.

The percentage of non-drinking days at follow-up was 78 (57-100).

3.1 Depression & Anxiety

The BDI score at the initial assessment was 26 (18-30) which indicates the presence of "moderate" depressive symptoms across the group. The CHS score was 5.5 (4.0-8.0) indicating that hopelessness was "mild" during detoxification. The anxiety level was also low at the initial assessment with a BAI score of 7 (4-11). A significant reduction in reported symptoms was recorded at follow-up with BDI 13 (6-17) (P=0.011) - "mild" and CHS 3 (2-5) (P=0.026) - "minimal", whereas no significant change was observed in BAI scores from a ward level of 7 (4-11) to 12 (4-16) at follow-up.

There was no correlation between BDI (P=0.70, R=0.10), CHS (P=0.19, R=0.33), or BAI (P=0.76, R=0.08) scores at the initial assessment and those at follow-up.

No correlation was found between symptoms of depression, hopelessness or anxiety scores during detoxification and percentage of non-drinking days BDI (P=0.82, R= -0.06), CHS (P=0.75, R= -0.08), and BAI (P=0.73, R=-0.09).

3.2 Motivational level

None of the patients were found to be in a precontemplation stage either on the ward or at follow-up. Contemplation stage patients on the ward had 82.5% (65-100) non-drinking days whilst those in the action stage reported 56.5% (44-100) non-drinking days (NS). Eight of the patients (Table 2) had a shift in motivational level between detoxification and follow-up. There was no obvious relationship between motivational level and the percentage of non-drinking days. Five patients were found to have a higher, and three a lower, motivational level at follow-up.

Table 2 . Motivation levels and non-drinking days.

Motivational stage		Patients	Non-drinking days
Detoxification	Follow-up	n	%
Contemplation	Contemplation	7	73
Contemplation	Action	5	87
Action	Action	3	57
Action	Contemplation	3	56

Terminology refers to the Stages of Change Model (Prochaska and DiClemente, 1986).

3.3 Neuropsychological Performance

TMT performances during detoxification were poor with t-scores of 37 (34-46), which was significantly lower (P=0.01) than the reference t-score of 50. Performance improved at follow-up to 43 (37-55) (P=0.02) compared to the initial assessment. No correlation was found between the initial TMT performance and the percentage of non-drinking days (P=0.58, R=0.14).

As may be seen in Table 3 the WCST results were poor and were generally in the same range as has previously been observed in patients with frontal lobe damage (Axelrod et al.,). At follow-up there was a significant improvement in the number of Errors (P=0.017) and Number of Categories (P=0.028) whilst Perseverative Responses, Perseverative Errors, and Conceptual Level showed only a tendency towards improved performance. Although some of the measures of the WCST had improved at follow-up, the results were still generally poor and significantly lower compared to those of normal controls. There was a highly significant correlation between performance at the initial assessment and at follow up for all measures (P= <0.001 - 0.002, R= 0.675 – 0.778).

A highly significant positive correlation was found between the different performance measures on the WCST and the percentage of non-drinking days (Table 4).

4. Discussion

The group of long-term alcohol dependent patients focused on in the present study was selected on account of being notoriously hard to follow-up and evaluate after an appropriate period of sobriety. Despite this fact, persistent efforts to trace the patients led to a retention rate of approx. 70% in the study. Furthermore, the dropouts did not differ from those patients who attended the follow-up appointment in any of the measures at the initial assessment. Thus the findings of the study are likely to be representative for the patient population targeted.

Table 3 Wisconsin Card Sorting Test Performance

Domain	Performance during detox (n=18) Median (IQ range) M+SD	Normals* (n=356)	Correlation non-drinking P	Frontal* (n=59) M+SD
Errors	78 (68-85)**	99.3$\pm$13.0	0.007	80.9$\pm$18.4
Perseverative Responses	85 (61-93)** 100.4$\pm$14.8		0.007	81.1$\pm$21.9
Perseverative Errors	84 (61-96)** 100.2$\pm$14.6		0.006	80.0$\pm$20.5
%Conceptual Level	78 (69-85)**	99.4$\pm$13.1	0.006	82.7$\pm$18.1
Categories	3 (1-4)**	5.2+1.5	0.017	3.4+2.2

Note: All variables, with the exception of number of categories (raw data) are age- and education-corrected standard scores.

*   Data from Axelrod et al. (1996). **   Significantly different from normals (p=0.01).

Table 4. Correlation between performance on five variables of the Wisconsin Card Sorting Test during detoxication and percentage of non-drinking days.

Domain	Performance during Detoxification (n=18) Median (interquartile range)	Correlation non-drinking days P	R
Errors	78 (68-85)	0.003	0.652
Perseverative Responses	85 (61-93)	0.003	0.660
Perseverative Errors	84 (61-96)	0.003	0.662
% Conceptual Level	78 (69-85)	0.003	0.665
No. of Categories	3 (1-4)	0.012	0.579

Note: All variables with the exception of number of categories (raw data) are age- and education-corrected standard scores.

The high levels of depressive symptoms reported by the patients during detoxification are consistent with previous observations (Brown and Schuckit 1988). Surprisingly, depressive symptoms did not affect short-term prognosis, which is at variance with other studies where depressive symptoms have been found to be predictive of relapse (Parsons et al., 1990; Castor & Parsons, 1977; Marlatt & Gordon, 1985). However, decline of depressive symptoms during follow-up was observed, with only a few individuals reporting significant depressive symptoms at the second assessment. The remittance of such symptoms at follow-up is consistent with previous reports (Parsons and Nixon, 1993; Davidson, 1995), and may explain the lack of association between depressive symptoms during detoxification and alcohol consumption. This is supported by the fact that no correlation existed between depressive symptom scores at the two assessments, which also suggests that patients with true affective disorders are not readily identified during inpatient detoxification.

It was surmised that the gravity of this group's situation, e.g. long-standing alcohol dependence, medical, social problems etc. might have led to a sense of hopelessness which would initiate, or at least pave the way to a serious relapse. However, the hopelessness component of depression was not reported to be a major problem, even during detoxification when other depressive symptoms were prevalent, which may explain the lack of predictive value. It is difficult to say whether the reported low sense of hopelessness reflects a lack of insight among these patients regarding the gravity of their behaviour or a residue of real optimism and hope.

Anxiety levels were low on the ward and this may be accounted for by the use of oxazepam as the standard medication in the detoxification treatment. Self-reported anxiety symptoms at follow-up showed a tendency to increase although were still in the "minimal" range. Contrary to widespread beliefs, anxiety symptoms are thus not likely to contribute to outcome in this particular type of severely alcohol dependent patient.

Two-thirds of the patients were assessed as being in the contemplation stage, i.e. ambivalent about committing to a major change in their drinking behaviour. These patients were apparently ambivalent to change in spite of a wealth of information and recent experience of the negative consequences of their drinking behaviour. Also, almost half of the patients changed motivational stage between detoxification and follow-up. Surprisingly, no obvious differences in non-drinking days were observed related to readiness to change and despite a majority of the patients being in the contemplation stage, non-drinking days at follow-up averaged 78%. It is thus likely that motivational level interacts with other factors in determining outcome. More specifically, readiness to change may be of little importance if the patient's capacity for adaptive behavioural strategies is diminished because of impaired cognitive function.

It has long been the praxis not to administer neuropsychological tests a short time after a serious drinking episode, based on the insight that use of benzodiazepines during detoxification as well as various sequelae of recent heavy drinking all may confound the results (Smith and McGrady, 1991). Indeed it might be suggested that the medication given during detoxification in the present study was the cause of poor WCST performance at initial assessment; in particular, since a correlation was found between performance scores and medication doses. Such an interpretation is, however, made unlikely by other findings in this study. Thus a high degree of correlation in WCST performance between initial and follow-up assessment in a non-medicated state

was found. This provides evidence that a major component of performance scores on both occasions reflects relatively stable traits in the patients. The high correlation between the first and second assessments is consistent with a previous study where early assessments of these data, the correlation between medication dose and WCST performance may easily be understood without assuming a direct causal relation: Patients with the heaviest drinking are likely to suffer both the most extensive neuropsychological impairment, and the most severe withdrawal symptoms, leading to the use of the highest medication doses.

The intellectual, or cognitive, component has been the target for several aftercare programmes and the poor results in this group of patients with long-standing, severe alcohol dependence may be attributed to the impaired cognitive functioning in these patients. A variety of cognitive impairments have been described in long-standing alcohol dependence (Weinstein and Shaffer, 1993), and can often be demonstrated in more than 50% percent of investigated subjects (O'Mahoney and Doherty, 1996, Parsons, 1993). The prognostic power of impaired cognitive functions regarding post-treatment drinking and aftercare attendance has been demonstrated in several studies (Smith and McGrady, 1991), although neuropsychological evaluation was of limited prognostic value in other studies (Eckardt et al., 1988). The discrepancies between previous results may be due to the population studied. More specifically the predictive value of impaired cognitive functions is likely to become more evident in patients with severe long-standing alcohol dependence, where cognitive impairment is prominent.

ECF is generally associated with, although not specifically limited to, the prefrontal cortex. However, it has become evident that executive functions, as measured by the WCST, are also dependent on other brain areas (Anderson and Damasio, 1991; Mountain & Snow, 1993; Abbruzzese et al., 1995). Conventional as well as functional brain imaging studies will be needed to anatomically characterise the neural substrate(s) of the neuropsychological impairment found in this study, and to determine their morphological and/or functional nature.

Although all measured cognitive functions were impaired in this study, only tests of executive functions were predictive of drinking during follow-up. This finding may be of clinical relevance. In this study the observations of pronounced perserveration in the face of negative feedback, as well as poor conceptual level performance are clear indications of problems in developing and maintaining an appropriate problem-solving strategy. Treatment programmes often make unwarranted assumptions about patients' ability to profit from standard treatment approaches (Allen et al., 1997). Moreover, several treatment modalities, which have proved to be effective, such as relapse prevention and cognitive treatment programmes, presuppose reasonably intact intellectual functioning. At the same time present results suggest that alcohol dependent subjects admitted for inpatient detoxification may have problems in this area in a manner that affects outcome. If these findings can be replicated and generalised, the importance of impaired cognitive functioning, and especially impairment of executive functioning will have to be taken into account when choosing the treatment modality for this group of patients. It should be remembered that the results of the present study have been obtained investigating a limited number of patients. Future studies along the lines suggested above would greatly benefit from a studying a larger patient population.

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