Treatment Outcome of Alcoholics with and without Cocaine Disorders

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The treatment outcome literature suggests that alcoholics with co-existing drug dependence have worse prognoses. We compared three groups of inpatients treated on the same hospital unit for disorders of alcohol only (n = 51), cocaine only (n = 27), or both disorders (dual group, n = 27). At follow-up, we contacted 105 (81%) of 129 patients at a mean of 13.4 ± 4.1 months after discharge. The three groups significantly and equivalently decreased their consumption of substances at follow-up, and they also had equivalent improvements in employment and in medical and psychiatric well-being. A nonsignificant trend existed for greater abstinence in the alcohol group (53%) than in the dual group (35%), and with regression analysis diagnostic group and stable residence predicted abstinence in the past 30 days. Elapsed time before using alcohol was equivalent for the two alcohol groups, and relapse to alcohol preceded relapse to cocaine by 1 month on average. In sum, outcomes were more similar than different for the three groups. Although specific treatments to enhance abstinence for cocaine users are indicated, clinicians should approach cocaine-using alcoholics with equal optimism for improvement as with other alcoholics.

Key Words: Treatment Outcome, Alcoholism, Cocaine, Substance Abuse, Residential Treatment.

FEW STUDIES HAVE specifically compared the outcomes of alcoholic patients with and without coexisting cocaine disorders. Miller and colleagues[1] compared the outcomes of inpatients with either alcohol dependence alone or cocaine dependence (of which 94% also had alcohol dependence). At 12 months, current abstinence rates for alcohol and other drugs, respectively, were lower in the cocaine group (62% and 66%) than in the alcohol group (71% and 96%), but statistical analyses and psychosocial outcomes were not reported. Walsh and colleagues[2] found that cocaine-using alcohol abusers were significantly more impaired than others at a 2-year follow-up assessment. More recently, Carroll and colleagues[3] reported that concurrent alcoholism worsened the prognoses of 94 treated cocaine abusers across multiple outcome dimensions, but they did not study an alcohol-only group.

The purpose of this study was to compare the treatment

outcomes of alcoholics with and without coexisting cocaine disorders in terms of hospital course, substance use, employment, medical problems, psychiatric symptoms, and further treatment. We hypothesized that cocaine-disordered alcoholics have worse prognoses than other alcoholics. We also included a comparison group of patients with cocaine disorders only.

METHODS

The study was conducted after obtaining approval from the Human Subjects Committee at the University of Michigan Medical Center.

Subjects

We conducted a computer search of discharge diagnoses for inpatients who were consecutively discharged between December 1986 and January 1988 from the University of Michigan alcohol and drug treatment unit. Our search yielded 139 cases whose discharge diagnoses fit into one of the following three groups: (1) alcohol abuse or dependence only (alcohol group), (2) cocaine abuse or dependence only (cocaine group), or (3) both an alcohol and cocaine disorder ("dual" group). Discharge diagnoses were clinically determined by the consensus of an attending (K.J.B.) and a resident psychiatrist using the DSM-III criteria[4] before June 1987 and the DSM-III-R criteria[5] starting in June 1987. Of the 139 cases identified by computer, we were able to locate 130 hospital charts for a retrospective chart review.

As a further check on group assignment, we searched for patients in the cocaine-only group who had blood alcohol levels >5 mg/100 ml on admission (n = 0) and for patients from the alcohol-only group who had positive urine drug screens for cocaine at the time of admission (n = 4). Blood alcohol levels were determined by a breath testing device for which readings at or below 5 mg/100 ml were clinically disregarded, because of the sensitivity of the instrument. Three of the cases with positive urines for cocaine were reassigned to the dual group, because chart reviews revealed a cocaine disorder. The other case was excluded from the study, because the data were insufficient to rule out a cocaine disorder. After refining the groups, no cases in the alcohol-only group had a positive urine test for cocaine.

Of the 129 remaining cases, we were able to contact 105 patients (81.4% of 129) for a follow-up interview. Of the 24 patients whom we did not interview, 5 were contacted but refused to participate and 19 were lost to follow-up. We compared the 105 patients who consented to a follow-up interview and the 24 unavailable patients in terms of diagnostic group, age, gender, race, education, employment, marital status, prior treatment, ages at first use of alcohol and cocaine, durations of problematic alcohol and cocaine use, quantities and frequencies of alcohol and cocaine use, medical problems, and psychiatric symptoms. Of 19 comparisons, one significant difference was found. For cocaine users, "followed" patients (mean = 23.8 ± 7.2 years) were significantly older than nonfollowed patients (mean = 18.9 ± 6.6) when they first used cocaine ($t = -2.06$, $df = 58$, $p = 0.043$). Importantly, the three diagnostic groups contained equivalent proportions of patients who were

followed (χ^2 = 0.29, df = 2, p = 0.865). Altogether, we contacted 51 patients in the alcohol group, 27 patients in the cocaine group, and 27 patients in the dual group.

Data Collection

Baseline ($t1$) characteristics of patients were determined by a retrospective chart review. One reviewer recorded pertinent information from each medical chart onto a structured form that allowed for easy coding and computer entry. Patients were rated as having medical problems if the chart review indicated alcohol-related health problems (such as cirrhosis, pancreatitis, or convulsions) or cocaine-related health problems (such as heart attacks, arrhythmias, strokes, or convulsions). Psychiatric problems were determined from the history and mental status exam as conducted by a psychiatry resident for each patient. A psychiatric severity score (range 0–10) was calculated as the sum of 10 items: serious depression; serious anxiety or tension; hallucinations; trouble understanding, concentrating, or remembering; trouble controlling violent temper; thoughts of suicide; attempted suicide; prior treatments for psychological or emotional problems; receiving a psychiatric disability; and medications previously prescribed for a psychiatric problem.

Follow-up ($t2$) data were obtained 6–23 months after discharge (mean = 13.4 ± 4.1 months) by a structured telephone interview, which we designed for this study. Subjects were told the purpose of the telephone call, given assurance about confidentiality, and then asked if the interviewer could proceed, all according to a written script. An affirmative response constituted verbal consent to participate in the study. Subjects were read 86 questions that required either yes–no responses, numerical answers, or multiple choice responses. The questions in the telephone interview were patterned as much as possible after the baseline ($t1$) data recorded from the chart review. Thus, responses required minimal interpretation, were easily coded, and were readily comparable to the baseline ($t1$) data. Interviews were completed in 30 min on average. We used two telephone interviewers, one medical student, and one research nurse who were closely supervised by a psychiatrist (K.J.B.), but we did not determine interrater reliability. Although the validity of the telephone interview was not corroborated by a collateral informant or body fluid analysis, interviewers rated their own confidence in the validity of the information obtained. Overall, the interviewers rated 76.7% of the interviews with confidence, and the three diagnostic groups did not differ in their confidence ratings (χ^2 = 1.80, df = 2, p = 0.407).

Treatment

All patients were treated on the same inpatient treatment unit for detoxification and rehabilitation. Patients attended the same program activities together as a group, regardless of diagnosis. Completed treatment averaged between 2 and 3 weeks, and consisted of lectures, individual and group therapy, relapse prevention counseling, activity therapy, and attendance at 12-step groups. Family and significant others were encouraged to attend both an education group and an individual family session. Medications were not prescribed for substance dependence, except benzodiazepines as needed for alcohol withdrawal. An aftercare plan was developed for each patient before a regular discharge.

Data Analysis

At baseline ($t1$) we compared groups using likelihood ratio χ^2 tests for categorical variables and analyses of variance (ANOVAs) for continuous variables. If the three groups differed, then we ran contrasts between the alcohol and dual groups, and between the dual and cocaine groups. We used t tests when only two groups were compared on continuous variables, and a Fisher's exact test if cell sizes were too small for valid χ^2 testing. Similar tests were used at $t2$ for treatment utilization. All tests were two-tailed. For each $t1$ variable that differed significantly among groups, we determined its effect on, or correlation with, three major outcome variables: total abstinence, past 30-days abstinence, and psy-

chiatric severity. Only age differed among groups at $t1$ and also differed between patients who did and did not remain abstinent. Thus, age was entered as a covariate or as a predictor variable in our $t1$–$t2$ comparisons.

Most of the primary outcome measures were skewed, because many patients consumed no substances at follow-up. For continuous variables, therefore, difference scores ($t2$ − $t1$) were analyzed instead of using repeated measures ANOVAs, which assume normally distributed scores. Analyses of continuous variables were conducted in two steps. First, a time effect was determined using a t test; i.e., did the mean difference score differ significantly from 0? This test was equivalent to a paired t test. Second, analyses of covariance were used to test group differences in change over time while covarying for age. For categorical (yes–no) variables, change codes (analogous to difference scores) were constructed, resulting in three possible outcomes over time: a positive change, no change, or a negative change. Then logistic regression analyses were used to test if diagnostic group and age predicted the three change categories.

Finally, we used step-wise multiple regression techniques to determine the best predictors of abstinence for the two alcohol groups.

RESULTS

Baseline Characteristics (t1)

Demographic Characteristics. The three groups differed in age and race, but did not differ in gender, employment, married status, or education (Table 1). The alcohol group (mean = 37 years) was significantly older than the dual group (mean = 31 years) and had more whites (90% vs. 52%). More than twice as many individuals in the alcohol group (28%) as in the dual group (11%) lived alone, but the difference was not significant (χ^2 = 3.16, df = 1, p = 0.075). Indices of social stability did not differ between groups. Overall, 60% of the sample had a stable residence, and 25% had a stable job over the 6 months before admission.

Substance Use. The alcohol and dual groups did not differ in age of first alcohol use (mean = 14.6 years), nor did they differ in the duration of problematic alcohol use (mean = 8.9 years). They also did not differ in terms of their frequency or quantity of drinking (Fig. 1). Likewise, the cocaine and dual groups did not differ in age of first cocaine use (mean = 23.8 years), in the duration of problematic cocaine use (mean = 2.0 years), or in the frequency or quantity of cocaine use (Table 1 and Fig. 2). Similar proportions of the cocaine (85%) and dual users (74%) smoked crack cocaine as their preferred mode of use (χ^2 = 1.04, df = 1, p = 0.308). Significantly more individuals in the alcohol group (61%) than the dual group (30%) received prior treatment for substance disorders, but the dual and cocaine (33%) groups did not differ significantly (Table 1).

The dual group (63%) was significantly more likely than the alcohol (8%) and cocaine (7%) groups to have coexisting cannabis abuse or dependence (χ^2 = 35.82, df = 2, p < 0.001). No other substance diagnoses distinguished the three groups, which had the following frequencies (abuse and dependence combined): sedative-hypnotics (4%), amphetamine (2%), opioids (1%), hallucinogens, phencyclidine, or inhalants (0%). Urine testing confirmed the di-

Table 1. Pretreatment Characteristics

Variable	Alcohol group ($n = 51$)[*]	Dual group ($n = 27$)[*]	Cocaine group ($n = 27$)[*]	Alcohol vs. dual p value[†]	Dual vs. cocaine p value[†]
Demographic variables					
Age (yr)[‡]	36.8 ± 14.1	30.5 ± 7.9	26.8 ± 5.4	0.018	0.220
% Male	66.7	66.7	59.3	NS	NS
% White	90.2	51.8	33.3	<0.001	0.167
Education (yr)[‡]	12.8 ± 2.5	11.8 ± 1.9	11.9 ± 1.3	NS	NS
% Employed	29.4	44.4	25.9	NS	NS
Stable job for 6 mos (%)	23.5	37.0	14.8	NS	NS
% Married	15.7	11.1	7.4	NS§	NS§
% Living alone	28.0	11.1	0	0.075	0.236§
Stable residence for 6 mos (%)	62.0	62.5	52.0	NS	NS
Substance use					
Age at 1st alcohol use[‡] (yr)	14.5 ± 4.0	14.6 ± 4.3	NA¶	NS	—¶
Duration of problem alcohol use[‡] (yr)	9.0 ± 7.2	8.7 ± 6.8	NA¶	NS	—¶
Age at 1st cocaine use[‡] (yr)	NA¶	24.6 ± 8.2	23.2 ± 6.4	—¶	NS
Duration of problem cocaine use[‡] (yr)	NA¶	2.3 ± 3.2	1.7 ± 1.4	—¶	NS
Prior substance treatment (%)	60.8	29.6	33.3	0.008	0.769

* Sample sizes may be smaller for some comparisons due to missing values.

† If overall p value for comparing the three groups was significant, then p values for the contrasts are shown. If overall p value for three groups was not significant, then columns are marked "NS" Two-tailed likelihood ratio χ^2 tests and t tests were used for contrasts, except where noted.

‡ Mean ± SD.

§ Fisher's exact test was used.

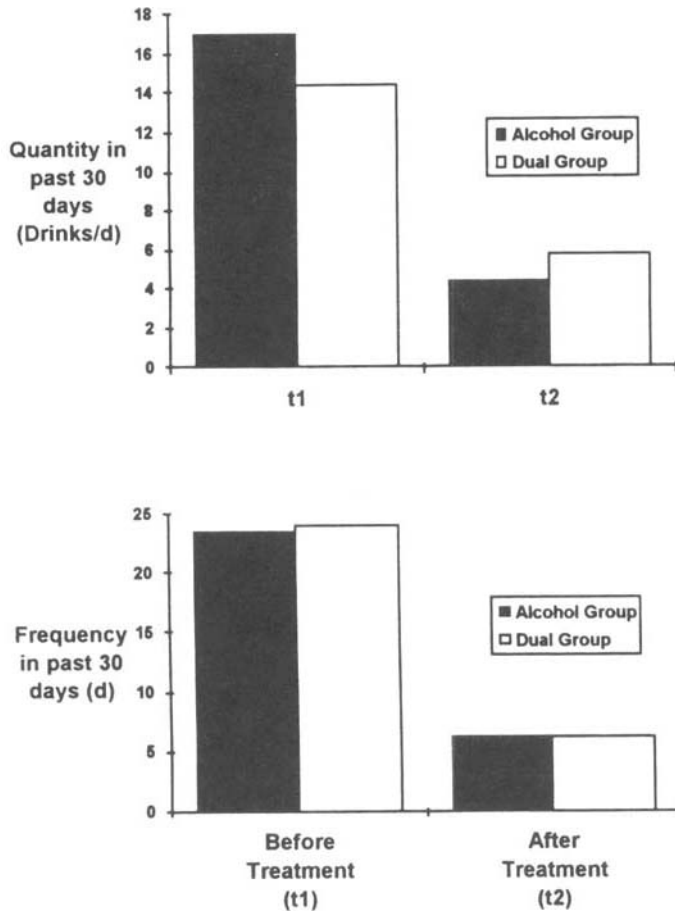¶ Comparison not applicable.

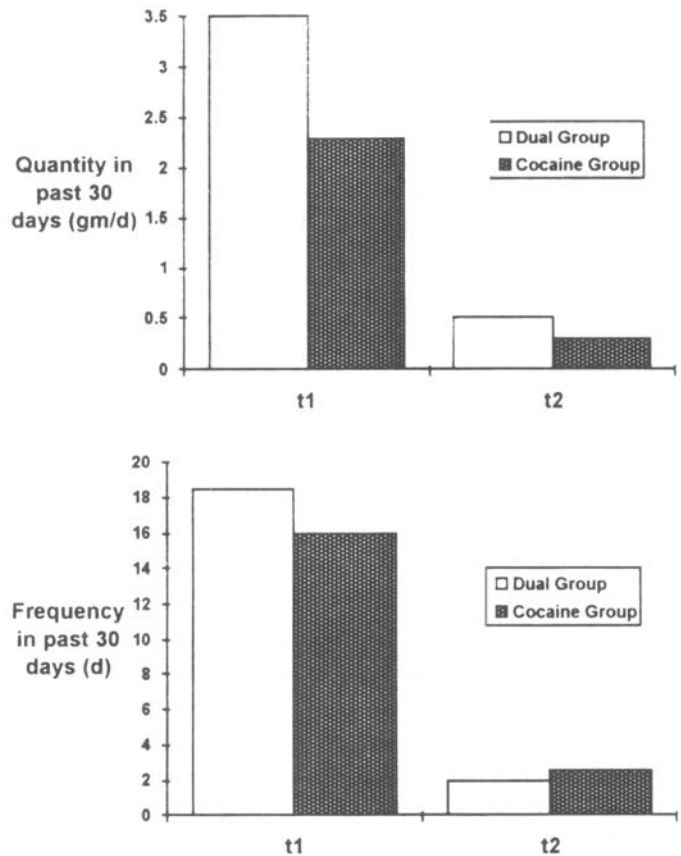Fig. 1. Alcohol consumption before and after treatment by diagnostic group.

Fig. 2. Cocaine consumption before and after treatment by diagnostic group.

agnostic similarities and differences between the three groups.

Medical and Psychiatric Status. The alcohol (23.5%) and dual (14.8%) groups did not differ in the proportion

with alcohol-related health problems ($x^2 = 0.82$, $df = 1$, $p = 0.355$). Similarly, the dual (25.9%) and cocaine (29.6%) groups did not differ in the proportion with cocaine-related health problems ($x^2 = 0.09$, $df = 1$, $p = 0.761$). The three groups differed significantly on psychiatric severity ($F = 3.96$, $df = 104$, $p = 0.022$), with the alcohol group having the most severity (mean = 3.2 ± 1.9) and the cocaine group having the least severity (mean = 2.0 ± 1.8). However, contrasts with the dual group (mean = 2.7 ± 2.1) were not significant.

Hospital Course. The three groups did not differ in the percentage completing the program with a regular discharge (73%), mean length of stay (16.6 days), or the percentage who had family or friends attend treatment programming (79%) (Table 2).

Follow-Up Ratings (t2)

Follow-up durations differed significantly between the dual (mean = 15.1 ± 4.6 months) and cocaine (mean = 11.5 ± 3.2 months) groups ($t = -3.42$, $df = 53$, $p = 0.001$). Because the groups also differed at $t1$ in age, race, living situation, prior treatment, cannabis abuse, and psychiatric severity, we looked for correlations or effects of each of these variables on abstinence measures and psychiatric severity at $t2$. We did not find that follow-up durations differed between those who remained abstinent and those who did not ($t = 0.42$, $df = 103$, $p = 0.674$). Not surprisingly, we found that psychiatric severity at $t1$ correlated significantly with psychiatric severity at $t2$ ($r_s = 0.37$, $df = 104$, $p < 0.001$). The only other significant difference was that individuals who remained abstinent throughout the follow-up duration were significantly older (mean = 38.9 ± 14.8 years) than those with any use (mean = 30.4 ± 9.5) ($t = -3.46$, $df = 35$, $p = 0.008$ for unequal variances). Thus, we used age as a covariate in our analyses of change over time.

Substance Use. Both the alcohol and dual groups had

Table 2. Treatment Utilization*

Variable	Alcohol group (n = 51)†	Dual group (n = 27)†	Cocaine group (n = 27)†
Hospital course (t1)			
Completed program (%)	76.5	77.8	63.0
Length of stay‡ (days)	17.3 ± 7.2	17.4 ± 7.6	14.6 ± 5.7
Family or friends attend program (%)	76.5	74.1	88.9
Treatment utilization (t2)			
Attended inpatient treatment after discharge (%)	4.0	4.0	3.8
Attended outpatient treatment in last 30 days (%)	20.4	4.0	7.4
No. of 12-step meetings attended in last 30 days‡	5.3 ± 8.6	4.3 ± 9.3	2.1 ± 6.8
Most 12-step meetings attended in 1 week since discharge (no.)‡	5.0 ± 5.4	3.9 ± 4.6	3.0 ± 3.4

* None of the comparisons between the alcohol and dual groups, or between the dual and cocaine groups were significant.
† Sample sizes may be smaller for some comparisons due to missing values.
‡ Mean ± SD.

significantly and equivalently reduced their frequency and quantity of drinking at follow-up (Fig. 1). The mean reduction in drinking days over time was significant ($t = 9.42$, $df = 63$, $p < 0.001$), as was the mean reduction in drinks/day ($t = 9.24$, $df = 60$, $p < 0.001$). After covarying for age, the patients in the two groups did not differ in their reduction of either quantity ($F = 0.00$, $df = 1$, $p = 0.978$) or frequency ($F = 0.08$, $df = 1$, $p = 0.773$) of drinking. Likewise, both the dual group and cocaine group had significantly and equivalently reduced their frequency and quantity of cocaine use at follow-up (Fig. 2). The mean reduction in cocaine-using days over time was significant ($t = 7.71$, $df = 42$, $p < 0.001$), as was the mean reduction in g of cocaine used/day ($t = 4.73$, $df = 39$, $p < 0.001$). After covarying for age, the patients in the two groups did not differ in their reduction of either quantity ($F = 2.91$, $df = 1$, $p = 0.096$) or frequency ($F = 0.22$, $df = 1$, $p = 0.644$) of cocaine use.

Abstinence rates revealed that 33.3% of the alcohol group and 15.4% of the dual group remained alcohol-free for the entire follow-up period ($x^2 = 2.99$, $df = 1$, $p = 0.084$). For the 30 days before follow-up, 52.9% of the alcohol group and 42.3% of the dual group remained alcohol-free ($x^2 = 0.78$, $df = 1$, $p = 0.377$). Forty percent of the dual group and 29.6% of the cocaine group remained cocaine-free for the full follow-up period ($x^2 = 0.62$, $df = 1$, $p = 0.432$), and 66.7% of the dual group and 77.8% of the cocaine group remained cocaine-free for the 30 days before follow-up ($x^2 = 0.78$, $df = 1$, $p = 0.375$). To compare abstinence rates among all three groups simultaneously, we compared abstinence from alcohol in the alcohol group with abstinence from cocaine in the cocaine group and abstinence from both alcohol and cocaine in the dual group. For the entire follow-up period, the alcohol group (33.3%) had three times the abstinence rate of the dual group (11.1%) compared with 29.6% for the cocaine group ($x^2 = 5.20$, $df = 2$, $p = 0.074$). For the 30 days before follow-up, the cocaine group had a higher rate of abstinence (77.8%) than the alcohol (52.9%) and dual (34.6%) groups ($x^2 = 10.5$, $df = 2$, $p = 0.005$), but only the contrast between the cocaine and dual groups was significant. For patients in the alcohol and dual groups who used alcohol after discharge, no significant difference was found between the mean intervals before resuming alcohol use (Fig. 3). Likewise, the dual and cocaine groups did not differ in the mean time to resumed cocaine use (Fig. 3).

Employment, Medical, and Psychiatric Status. The three groups did not differ in employment, medical, or psychiatric status at follow-up. More patients were employed at follow-up than at baseline, and fewer patients suffered with substance-related health problems at $t2$ than at $t1$ (Table 3). Neither diagnostic group nor age predicted changes in employment or health problems by logistic regression analyses. The mean reduction in psychiatric severity scores over time (mean = 0.6 ± 2.2) differed
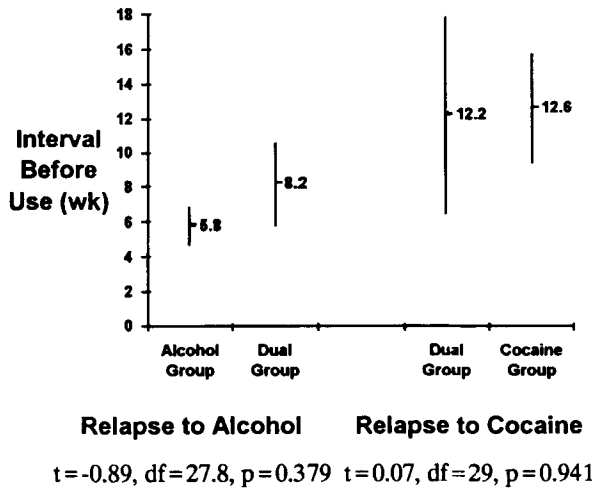
Fig. 3. Rapidity of relapse to preferred substances for those who used by diagnostic groups. Means ± 1 SE are shown. Differences between each pair of groups were not significant.

significantly from 0 ($t = 2.93$, $df = 103$, $p = 0.004$). After covarying for age, the difference between groups in reduction of psychiatric severity was not significant ($F = 2.15$, $df = 2$, $p = 0.123$).

Treatment Utilization. The three groups did not differ in their use of inpatient treatment for substance abuse after discharge (4.0% of sample) (Table 2). Five times as many alcohol patients (20.4%) as dual patients (4.0%) attended outpatient treatment in the past 30 days, which approached significance (Fisher's exact test, $p = 0.086$). Finally, the three groups did not differ significantly in their current or maximum attendance at 12-step meetings (Table 2).

Predictors of Abstinence for Alcohol Groups

Because few differences between groups were found at *t*2, we hypothesized that factors other than diagnostic group may predict outcome better. In particular, substance severity,[3,6] social stability,[7] psychiatric severity,[3,6,8] and treatment compliance[9] have been shown to predict outcome in other studies. Thus, we used multiple regression techniques to examine which variables among the various domains (Table 4) best predicted abstinence in the past 30 days for the alcohol and dual groups. The best predictors of abstinence were stable residence and diagnostic group, which correctly classified 72% of cases (goodness of fit χ^2 = 9.54, $df = 2$, $p = 0.008$).

DISCUSSION

All three groups significantly and equivalently decreased their consumption of substances at follow-up (Figs. 1 and 2). All three groups also had equivalent improvements in employment status, substance-related health problems (Table 3), and psychiatric problems following treatment. The three groups did not differ significantly in terms of program completion rates, new treatment episodes, or attendance at 12-step meetings (Table 2). A nonsignificant trend existed for patients in the dual group to relapse at a higher rate than patients in the alcohol group. In addition, when regression techniques were used for the alcohol and dual groups, diagnostic group was a significant predictor of abstinence in the past 30 days. Among those who relapsed, however, no differences were found in how long it took to relapse (Fig. 3). Taken together, there were more similarities than differences in outcome for the three groups, but the dual group had a poorer prognosis when abstinence was used as the outcome measure.

Our findings are consistent with two previous studies that reported worse outcomes for cocaine-using alcoholics than for other alcoholics when generic treatment approaches were applied.[1,2] Nevertheless, our cocaine users reported major improvements following treatment despite lower rates of abstinence. All of our cases were inpatients, and Walsh et al.[2] found that inpatient treatment was significantly more effective than assignment to either Alcoholics Anonymous (AA) alone or a choice of AA or inpatient treatment. Thus, clinicians should approach their inpatient cocaine-using alcoholics with the same optimism for improvement as with their other alcoholic inpatients, but specific programming for cocaine users may be needed to enhance abstinence.

Relapse to alcohol use preceded relapse to cocaine use by 1 month on average for the dual group (Fig. 3). Cocaine users should be specifically educated about this pattern of relapse. Moreover, cocaine-using alcoholics should be monitored closely for the first 3–6 months following inpatient treatment, because relapse to cocaine occurred most commonly during this time frame (Fig. 3). However, cocaine-using alcoholics attended outpatient treatment at a much lower rate than the alcohol-only group (Table 2), so intensive efforts to engage them in follow-up treatment may be needed to prevent relapse.

Several limitations apply to our study. First, we retrospectively reviewed charts for baseline (*t*1) data. Information was sometimes missing, and other information may have been inconsistently recorded or interpreted by the

Table 3. Employment and Medical Status Before and After Treatment

Variable	n	t1	t2	Change outcomes*		
				Positive	Negative	No change
% Employed	104	31.7	53.8	27.9	5.8	66.4
Alcohol-related health problems (%)	75	21.3	9.3	14.7	2.7	82.7
Cocaine-related health problems (%)	51	27.4	15.7	21.6	9.8	68.3

* Neither diagnostic group nor age predicted change outcomes by logistic regression analyses.

Table 4. Potential Predictors of Abstinence

Domains	Variables*
Substance severity	Diagnostic group†
	Age at first alcohol use
	Duration of problematic alcohol use
	Frequency of use in past 30 days
	Drinks/day in past 30 days
	Cannabis disorder
Social stability	Married status
	Stable employment for 6 mos
	Stable residence for 6 mos†
	Family or friends attend treatment
Psychiatric severity	Psychiatric severity score at $t1$
Treatment compliance	Completed program with regular discharge
	Length of stay
Other	Age

* Variables entered into stepwise multiple regression analysis.

† Variables shown to predict abstinence in past 30 days for the alcohol and dual groups in final model.

chart reviewer. Second, we relied solely on self-report for outcome data. Corroborating histories and body fluid analyses were not obtained at $t2$. Some patients may minimize or deny drinking.[10] Nevertheless, research suggests that self-reported data in alcohol studies are not inherently invalid.[11] In situations where confidentiality is assured and there are no negative consequences of telling the truth, validity is enhanced.[11,12] Moreover, the rates of abstinence reported by our alcoholic patients were comparable to those reported elsewhere in the literature.[13] Finally, confidence ratings in the reported information were high and did not differ among groups. Thus, even if patients minimized their substance use and problems at $t2$, we have no reason to believe the three groups differed in self-report bias. However, validity and sensitivity may have been further enhanced by using a time-line followback method for substance use[11] and a well-studied instrument such as the Addiction Severity Index[14] for medical and psychiatric severity. Another limitation of our study was the small sample size, which may have prevented some differences between groups from reaching statistical significance.

In conclusion, patients with alcohol and/or cocaine abuse and dependence responded favorably to the same inpatient treatment program when followed for an average of 1 year. Improvements in substance use, employment status, and medical and psychiatric well-being were reported. The alcohol group had higher rates of abstinence than the dual group. Further research is needed to develop specific treatments to improve outcomes for patients with both alcohol and cocaine disorders.

ACKNOWLEDGMENTS

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