



Chemical Aversion Therapy in the Treatment of Cocaine Dependence as Part of a Multimodal Treatment Program: Treatment Outcome

Journal of Substance Abuse Treatment, Vol. 7, pp. 21-29, 1990
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P. Joseph Frawley, MD and James W. Smith, MD
Schick Shadel Hospital, Santa Barbara, California, and Schick Health Services, Seattle, Washington

Abstract

A pilot feasibility study of chemical aversion therapy in the treatment cocaine dependence as part of a multimodal treatment program was conducted at the Schick Shadel Hospital of Santa Barbara. Twenty (20) patients (9 treating for cocaine only and 11 treating for cocaine/alcohol), who primarily snorted cocaine, completed a program which included chemical aversion therapy to develop a conditioned aversion to the sight, smell, and taste of a cocaine substitute (tetracaine, mannitol, and quinine with Psychem®. Ninety-five (95) percent of patients were followed up in six months with a total abstinence rate from cocaine of 56% (78% current abstinence of at least 30 days prior to follow-up) in the cocaine only group and total abstinence from cocaine of 70% (also 70% current abstinence) for the cocaine/alcohol group. Ninety (90) percent were followed up at 18 months. Thirty-eight (38) percent of the cocaine only group had been totally abstinent (75% were currently abstinent). Fifty (50) percent of the cocaine/alcohol group had been totally abstinent (80% were currently abstinent). Validation of results was obtained from "significant others" for 90% of patients.

Keywords-Chemical aversion therapy, cocaine treatment, treatment outcome, cocaine snorting.

Introduction

Cocaine dependence has progressively increased as a problem in the United States since its use rapidly accelerated in the early 1970s (Mittleman & Wetli, 1984; Culhane, 1989). The Schick Shadel Hospitals have provided treatment for alcoholism for over 50 years. During the early 1980s, more and more patients were being seen with a diagnosis of both alcohol and cocaine dependence. This occurred in other chemical dependence treatment programs (Black, Dolan, Penk, Rabinowitz, & DeFord, 1987). Chemical aversion therapy has been used in the treatment of alcohol addiction since 1935 (Voegtlin & Broz, 1949; Smith, 1982) and has been used for other dependencies such as marijuana (Morakinyo, 1983). Frawley (1987) has reviewed the theoretical role of aversion as part of a multimodal treatment program focusing on addiction as a neurobehavioral disease. Aversive counter-conditioning is not a substitute for support for life-enhancing behavior, rather it suppresses the undesirable behavior, while other modalities support positive alternatives (Saxe, Dovaterty, Esty, and Fine, 1983).

Intensive reviews of chemical aversion therapy have been conducted periodically by congress (Office of Technology Assessment (OTA) 1983) and the Office of Healthcare Technology Assessment (Carter, 1987), acknowledging that it is at least as effective as any other modalities available for the treatment of alcoholism. Wilson (1987) has questioned the efficacy of chemical aversion therapy; however, his review did not evaluate other treatment methods. His criticisms have been addressed by Howard and Jenson (1989) and Elkins (1989). Aversion therapy is recognized by the American Medical Society on Alcoholism and Other Drug Dependencies (AMSAODD) as an accepted part of a multimodal treatment program for alcoholism (AMSAODD, 1986).

We decided to explore the possibility of expanding the use of this modality to include the treatment of cocaine dependence in which “snorting” was the principal method of use. Gold (1984) notes that “snorting” is the most common method of cocaine use. It is also a type of ingestion behavior which may be successfully linked to the aversive stimulus of nausea. The level of aversion to alcohol is directly related to the length of abstinence after treatment (Cannon, Baker, Gino, & Nathan, 1986). There are no data that speak to this question with respect to cocaine. The goal was to provide treatment for patients with cocaine dependence only or with alcohol and cocaine dependence and to determine the possibility of integrating chemical aversion therapy into the multimodal treatment protocol.

This report concerns itself primarily with the question of treatment outcome.

Methods

Twenty-one (21) patients volunteered to enter this program and indicated that snorting cocaine was the primary method of use. The 10 patients treated for cocaine only were treated without charge. Of the 11 patients treated for cocaine and alcohol, 9 were charged for the alcohol portion of their treatment program, but none of the patients were charged for the cocaine treatment portion. Two (2) patients were not charged for alcohol treatment because they had entered the hospital for the cocaine pilot study, and only after admission was alcohol dependence identified. Of the 10 cocaine-only patients, 5 had a history of previous treatment for alcoholism at Schick using aversion therapy. They were abstinent from alcohol and only requested cocaine treatment. All patients received a detailed explanation of the research project and treatment methods from the physician supervising their care. All gave informed consent to participate.

Patient Sample

The average age of the patients was 32 (range 18-47); there were 18 males and 3 females; 9 patients were married, 8 single/never married, and 4 were divorced or separated; and 17 were employed. All 21 were Caucasian.

The 10 patients who treated for cocaine only used an average of 2.45 gm of cocaine per day (range .25 gm-14 gm). They used the drug an average of 23 days per month (range 3-30 days/month). The average drug cost per month was \$3266 (range \$300-\$10,000). The average duration of use was 4.8 years (range 2-10 years). Five patients currently drank alcohol, and five were abstinent alcoholics. The drinkers averaged 3 drinks/occasion (range 1-6), and drinking frequency averaged 4.2 days per week (range “rare” to 7). Patients reported sporadic other drug use. The most frequently used other drug was marijuana. Of the 10 patients, 7 smoked marijuana an average of 17.6 days per month (range 1-30 days/month). The average Michigan Alcoholism Screening Test (MAST) score for the three drinkers who properly completed the test was 6 (range 0-16), and the average Missouri Alcoholism Severity Scale (MASS) score was 1.6 (range 0-3). (See below for discussion of self-administered tests for chemical dependency.) The one patient who had a 16 on the MAST caused the average to exceed 5, which has been considered the cutoff for alcoholism. This patient refused the recommendation to also treat for alcohol at no charge. His MASS was 3, which is low. The first three patients were given the Addiction Severity Index (ASI). The last seven were given the Drug Abuse Screening Test (DAST) because it is shorter and because much of the other information on the ASI was being gathered elsewhere. The average ASI score for Drugs was 5.2 (range 2-9). The average DAST score was 6.5 (range 5-8). These scores indicate a moderate level of addiction. The possible scores for both tests range from 0 (“no problem”) to 9 (ASI) or 10 (DAST) (“severe”).

The 11 patients who treated for both cocaine and alcohol used an average of 2.47 gm of cocaine per day (range .25-14gm). They used the drug an average of 16.5 days per month (range 1-30 days/month). The average drug cost was \$1713/month (range \$30-\$5,000/month). The average duration of cocaine use was 5.7 years (range 0.5-16 yrs).

The average number of drinks per occasion was 11.6 (range 3-30), and the average number of days per week of

drinking was 3 (range 1-7). The average duration of the alcohol problem was 11.6 years (range 3-20). Other drug use in this group included 9 of 11 who reported smoking marijuana an average of 14.4 days/month (range 1-30); four (4) used amphetamines an average of 6.8 days/month (range 1-21 days); three (3) patients used sedative drugs an average of 11.7 days/ month (range 1-30).

The MAST scores averaged 14 (range 0-26), and the MASS score averaged 16 (range 2-32). Six (6) patients took the DAST and had an average score of 6.8 (range 5-9). Five (5) patients took the ASI. Their drug score averaged 8.4 (range 7-9). These scores indicate a moderate-to-severe drug problem and a moderate-to severe alcohol problem in the cocaine/alcohol group.

Self-Administered Tests of Addiction Severity

Initially, the Addiction Severity Index (ASI) (McLellan, Luborsky, Woody, & O'Brien, 1980; McLellan et al., 1985) was utilized, but because it covered much the same material as the standard psychosocial evaluation being utilized at the hospital, the DAST (Skinner, 1982) was substituted to assess the level of severity of drug dependence. Possible scores on the ASI range from 0 to 9. Scores of 6.5 indicate a moderate level of a drug problem. Possible DAST scores range from 0 to 10. Scores above 5 are indicative of a significant drug problem and correspond to patients seeking treatment for drug dependency. The short MAST (Pokorny, Miller, & Kaplan, 1972) and MASS (Missouri Alcoholism Severity Scale) (Evenson, Reese, & Holland, 1982) tests were self-administered by each patient and scored by the research team to assess the level of alcohol dependence. Scores greater than 5 on the MAST indicate a high likelihood of alcoholism. Average scores of 13 (SD = 12.85) on the MASS were characteristic of patients seeking outpatient treatment for alcoholism, while scores averaging 20 (SD = 13.2) were characteristic of hospitalized alcoholic patients.

Treatment Program

The treatment program followed closely the Schick alcoholism treatment program which is described in more detail elsewhere (Smith, 1982). Eleven (11) patients received detoxification (10 treating for cocaine and alcohol and 1 treating for cocaine only). Detoxification averaged 3 days (range: 1-7 days), followed by 11 (for cocaine only) or 12 (for alcohol and cocaine) days of medical treatment combined with individual and group counseling. The term "medical treatment" includes those procedures in which the administration of medication and performance of procedures by a nurse are carried out under a physician's order. Medical treatments were divided into chemical aversion therapy on one day and sodium pentothal interviews on alternate days. In this manner the Cocaine/Alcohol patients received cocaine and alcohol aversion on one day and sodium pentothal interviews on the next. The Cocaine Only patients received cocaine aversion treatments on one day and sodium pentothal treatments on the next.

Sodium pentothal interviews are used to produce deep relaxation on alternate days from aversion treatment; to monitor desire for alcohol, cocaine, and other drugs; and to allow for the delivery of suggestions towards abstinence from these drugs. The results of interviews are used to direct the aversion treatment and counseling program (Smith, 1971).

Two (2) counseling groups a day were provided (morning and evening), and an average of 5 individual counseling sessions were carried out over the period of hospitalization. A multidisciplinary treatment plan was developed for each patient within 72 hours of beginning treatment. Prior to discharge, a continuing care plan was developed. Following discharge, patients were encouraged to enter hospital-sponsored support groups, 12-step self-help groups, church groups, or other support programs.

They returned at one month and three months from initial discharge for reinforcement treatments, which consisted of an aversion treatment on one day and a sodium pentothal treatment on the second day. Additional counseling and continuing care plan updates were also carried out at that time. Each patient was contacted on a regular basis as part of the continuing care plan.

Chemical Aversion Therapy

The stimulus used to represent cocaine was initially a mixture of tetracaine (2%) in mannitol (i.e., 20 mg of tetracaine in 1 gm of mannitol). Quinine (1%) was added to reduce the sweetness of mannitol and make the mixture taste more like “street cocaine” (Siegel, 1984). Psychem® (Old Factory, Inc., Atlanta, Georgia) contains oils which produce a scent similar to “street cocaine.” The inside of the “snorting” straw was impregnated with Psychem® so that when the user “snorted” the cocaine substitute, he or she would also receive the scent of street cocaine.

General Principles

The treatment room has pictures of paraphernalia for cocaine use, as well as a razor blade, a straw and mirrors for the preparation of lines. These, along with the cocaine substitute, serve as the conditioned stimuli. The patient faces a counter with an 8 x 11 inch mirror in front of him or her. The remainder of the background is black in order to enhance the whiteness of the cocaine substitute. The patient is seated in an armchair which has movable emesis basin and a movable tray upon which the lines are made and snorted. If alcohol is also included in the treatment, bottles and pictures of alcohol are also displayed and serve as conditioned stimuli along with the drinks themselves.

Upon entering the treatment room, the patient sees a mirror with white powder, a razor, and a straw. He or she is then instructed to sit down and to begin to use the razor to cut the pile of cocaine substitute into “lines.” The treatment nurse refers to the powder as “cocaine.” The first four lines are made from the tetracaine-quinine in mannitol mixture; the next series of lines are made from mannitol only, since at this point, the nose is already numb. The last four lines used in any treatment are made from the tetracaine-quinine in mannitol mixture (this prolongs the nasal mucosal numbness).

After returning to his or her room, he or she “snorts” two lines in association with post-treatment medication (see Treatment Procedure, p. 24). These final two lines are also made from the tetracaine-quinine in mannitol mixture. The number of lines used in each treatment progresses from 18 in the first treatment to 30 on the second treatment, 40 on the third, and 50 in the remaining treatments and reinforcement treatments. For the patients also receiving aversion for alcohol, alcohol is first introduced for aversive pairing in the third treatment session. In the first alcohol session, 8 drinks of different alcoholic beverages are consumed (approximately half of the drinks in each session are the patient’s preferred beverages). In the second alcohol session, 12 drinks; in the third, 16 drinks; and in the fourth, 20 drinks are ingested. In addition to the patient’s favorite beverages, by the end of the series of alcohol treatments, he or she has received aversion to bourbon, scotch, vodka, gin, brandy, tequila, rum, white wine, red wine, and beer. This is done because aversions may be developed specifically to one form of alcoholic beverage and not to others (Baker & Cannon, 1979, Quinn & Henbest, 1967).

Treatment Procedure

Each patient receives a complete history and physical examination and laboratory evaluation (see Laboratory, p. 25). On each aversion treatment day, the patient fasts from all solids for at least six (6) hours before treatment in order to prevent aspiration of any solid material. (Clear liquids are permitted.) The treatment nurse records the patient’s vital signs and explains the day’s treatment procedure in detail. The patient is then given an injection of emetine, pilocarpine, and ephedrine as well as oral emetine.

After approximately 8-10 minutes, the patient begins to experience nausea. Just prior to the onset of nausea, the individual is asked to begin to “snort” the “cocaine” lines in his or her usual fashion. He or she continues to “snort” the cocaine substitute while experiencing nausea until all the lines have been “snorted.” During the cocaine portion of the treatment, it is not important that the patient has any emesis since nausea (not emesis) is the aversive stimulus intended to be paired with the cocaine stimulus. In contrast, during the alcohol counter-conditioning portion of the treatment, vomiting is important because it empties the stomach of the ingested alcohol and thus prevents clinically significant absorption which would prevent adequate treatment response (Lemere, Voeglin, Broz, O’Hallaren, & Tupper, 1942).

The patient spends approximately 45 minutes in the treatment room after which he or she returns to his or her room for three hours of recovery. During this time the patient is encouraged to continue to focus on paraphernalia and pictures of cocaine while still experiencing the nausea. Patients are also encouraged to mentally pair the use of cocaine (and alcohol if appropriate) with negative consequences. In treatments 2 through 5 or 6 (depending on the treatment protocol), 30 minutes after returning to his or her room, the patient receives the post-treatment medication, consisting of oral emetine and tartar emetic mixed in either water (for the cocaine only patients) or stale beer (for the cocaine/alcohol patients). The patient also “snorts” two lines of the tetracaine, quinine, and mannitol mixture at that time. The purpose of the post-treatment medication is to prolong the nausea in association with the cocaine or cocaine/alcohol stimulus and thus enhance the development of aversion.

Treatment Medication

Intramuscular emetine dosages vary from 51 mg (in the first treatment) to 76 mg (in treatment 4 and the following treatments including reinforcements). A smaller dose is given in the first treatment because some individuals are more sensitive to the emetic effects of the drug. In these uncommon cases, subsequent dosages may also be kept at a lower level. The oral emetine dosage was 96 mg for all treatments. Intramuscular pilocarpine dosages ranged from 8 mg (in treatment #1) to 20 mg (in treatment #4 and the following treatments). For reinforcements the dosage was 8 mg. Ephedrine dosages ranged from 24 mg (in treatment #1) to 60 mg (in treatment #4 and the following treatments). For reinforcements the dosage was 24 mg.

On treatment #2 and following, the patient also receives additional oral emetine (36 mg) and progressively increasing dosages of tartar emetic ranging from 20 mg (in treatment #2) to 120 mg (in treatment #5 and following including reinforcements). This additional oral emetine and tartar emetic is given approximately 30 minutes after returning from the treatment room to the patient’s room.

All but one of the patients completing treatment for cocaine received only 5 aversion treatments (one patient required six treatments due to poor response to the initial five treatments). Those treating for cocaine and alcohol received 6 aversion treatments in order to allow the first two treatments to focus exclusively on cocaine and the next four to include both alcohol and cocaine.

In the last four cocaine/alcohol treatments, the treatment protocol calls for the patient to “snort” four lines of the cocaine substitute and smell and swish his or her favorite alcoholic beverage before the onset of nausea. The patient then drinks a specified number of alcoholic beverages while experiencing nausea and vomiting. After completing those beverages, the patient then “snorts” the additional lines of cocaine substitute. This ranges from 10 additional lines on the first treatment to 40 additional lines on treatment number four and the following treatments. Treatment is done in this order so that vomiting of the alcoholic beverages (which is necessary to prevent absorption of alcohol after ingestion) will be maximally facilitated by the activity of the medication. There was concern that if all the “cocaine lines” were “snorted” first, and the nausea inducing medication effect “wore off” during the “snorting” procedure, there would be inadequate medication effect to induce emesis of the alcoholic beverages given later, thus leading to retention of the alcohol.

Laboratory

Prior to treatment all patients had urine drug screens, an electrocardiogram (EKG), routine urinalysis, and blood drawn for CPK (MB fraction), as well as a CBC (complete blood count) and chemistry panel. A repeat electrocardiogram and CPK (MB fraction) were taken on the last day of the program following completion of the last treatment. Repeat electrocardiograms and urine drug screens were recorded on admission for each reinforcement treatment.

EKG reports were generated by a standardized, computerized program (Phonogram System, 1201 Corporate Boulevard, Reno, Nevada 89502, 702/348-1000). The EKG recordings and reports were reviewed and verified by a board-certified cardiologist.

Vital signs were recorded at the start and completion of each aversion treatment and after returning to the patient's room (at 15-minute intervals) until the completion of treatment (3 to 3½ hours). Patients were monitored for any significant untoward effects including arrhythmia or hematemesis. Other treatment-related symptoms experienced by the patient were also noted. Each patient's treatment record was reviewed daily by the attending physician with input from nursing staff and the patient to determine if treatment medication should be altered from a standard regimen.

Follow-up Method

A condition of participation for all patients in this pilot study was the provision of three names, addresses, and phone numbers of people who could be called to validate their abstinence status. At the six-month anniversary of discharge, the principal investigator (PJF) attempted to contact by phone the patient and at least one "significant other." A second follow-up was begun at 18 months post-treatment and completed at an average of 19.5 months post-treatment (range 18-22 months). At this time, a staff member who had not met or treated the patients contacted them and "significant others." A structured interview technique was used. The validity of the patient responses was checked by asking the "significant other" the same questions as the patient. Each patient's chart was also reviewed in order to get outcome information obtained during continuing care calls as well as from laboratory and other reports.

Both patients and "significant others" were asked about total abstinence since treatment as well as "current abstinence" (last 30 days). Research in the alcoholism treatment field has demonstrated that the question most likely to have positive concordance with a "significant other/collateral" is whether or not an individual has used alcohol at all since treatment (a categorical, yes-or-no measure) (Polich, 1982; Watson, Tilleskjer, Hoodecheck-Schow, Pucel, & Jacobs, 1984; Hoffmann, Harrison, & Bellile, 1984; Patton, 1978; Moberg, 1978). Reports of Current Abstinence (last 30 days) also have validity, but the concordance rate is less (Longabaugh et al., 1983; Patton, 1978; Hoffmann et al., 1984; Olson, Ganley, Devine, & Dorsey, 1981). Questions concerning frequency and amount have the least concordance (Pickers, Hatsukami, Spicer, & Sviris, 1985; Olson et al., 1981; Babor, Stephens, & Marlatt, 1987; Edwards et al., 1977; Longabaugh et al., 1983).

Each patient was asked if he or she had been totally abstinent from cocaine, alcohol, or any other mood-altering drug since treatment. If they had used any of these drugs, they were asked the date of their first and last use as well as the frequency of their drug use. Patients were also questioned about other areas of their life and activities that would be supportive of sobriety (e.g., support groups, employment, health care, finances).

Statistical Methods

Chi square analyses were done to evaluate differences of categorical variables, such as the relationship between the use of alcohol and cocaine use at the 6- and 18-month follow-up points.

Results

Safety

The issue of the safety of this treatment method is the subject of a separate paper (Frawley & Smith, 1989a). However, it can be stated that there were no untoward incidents during treatment. EKGs, CPK-MB fractions, and other laboratory and clinical data demonstrated no adverse effects.

Patient Acceptability

One patient left the program against medical advice (AMA). This was in response to confrontation by staff concerning his bringing drugs on the unit and to notification of child protective services regarding child abuse at home. He had completed one aversion treatment for cocaine only.

Except for the patient who left AMA, all 20 other patients completed the prescribed treatment program. All but 2 patients (18/20 or 90%) returned for their first reinforcement treatment one month later. The 2 patients who did

not return lived in Tacoma, Washington, and the distance (from the hospital in Santa Barbara, California) may have been a factor. A patient from Alaska did return for her first reinforcement treatment, but notified us at that time that, because of the distance, she would postpone the second reinforcement indefinitely.

Although 18 of 20 patients (90%) returned to the hospital for their first reinforcement treatment, 2 in the cocaine/alcohol group did not receive aversion treatment at that time. One (1) patient felt that the treatment had not been helpful and did not desire any further treatment. The other patient who had used cocaine since discharge, refused the prescribed two aversion treatments. One other patient was given aversion to alcohol only, because he felt the alcohol, but not the cocaine, treatment had been helpful to him.

Thus 16 of 18 (89%) received aversion treatment on their first reinforcement. In the cocaine-only group, 7 patients received aversion for cocaine. In the cocaine-alcohol group, 1 patient received aversion for alcohol only and 8 patients received aversion for cocaine and alcohol. Of the twenty patients, 9 (45%) returned for the second reinforcement treatment three months after completing initial treatment. Four of 9 (44%) in the cocaine-only group and five of 11 (45%) in the cocaine/alcohol group completed the second reinforcement. Of 17 California residents, 9 (53%) returned for the second reinforcement. All received two days of treatment consisting of one day for chemical aversion for cocaine or cocaine and alcohol, and one day for a sodium pentothal interview as well as group and individual counseling and continuing care plan update.

Treatment Outcome

The primary goal of treatment was to eliminate cocaine use in the 10 patients who chose to be treated for cocaine only. Abstinence from alcohol and cocaine was the objective in the 11 patients treating for both addictions. Table 1 summarizes the results of the follow-up contacts. At 6 months 95% (19/20) of patients completing treatment were contacted and 89% (17/19) had significant other/collateral validation. At the 18-month follow-up, 90% (18/20) were contacted, and 83% (15/18) had significant other/collateral validation. In one case the chart indicated a relapse, but the patient and significant other denied it. This case was counted as a relapse.

Total abstinence was defined as “no use of the substance since discharge.” Current abstinence was defined as “abstinence for at least 30 days prior to the follow up contact.” Although alcohol abstinence was not necessarily the patient’s goal (in those treating for cocaine only), it was still tracked as was other drug use including prescribed minor tranquilizers. The program philosophy is to promote abstinence from all mood-altering drugs. No aversion treatment was provided for marijuana or other drug use. Instead education and counseling were provided.

TABLE 1- Treatment Outcome and Follow-up: 6 & 18 months

	Cocaine Only	Cocaine/Alcohol
# Pts. completing program	9	11
# Pts. F/U @ 6 months	9 (100%)	10(91%)
Total abstinence	5(56%)	7(70%) 7(70%)
Current abstinence	7(78%)	7(70%) 8(80%)
# Pts. F/U @ 18 months	8(89%)	10(91%)
Total abstinence	3(38%)	5(50%) 4(40%)
Current abstinence	6(75%)	8(80%) 5(50%)

At 6 months post-treatment, 56% of the cocaine only group and 70% of the cocaine/alcohol group had been totally abstinent from cocaine. At the 18-month follow-up, the total rate of abstinence from cocaine was 38% in the cocaine-only group and 50% in the cocaine/alcohol group.

The current rate of abstinence from cocaine at 6 months was 78% in the cocaine-only group, and 70% for the alcohol/cocaine group. At the 18-month follow-up, 75% of the cocaine-only group were currently abstinent (the 3 patients who had relapsed but were now abstinent had been off an average of 8.6 months), and 80% of the alcohol/

cocaine group were currently abstinent (3 relapsed patients now averaged 5.3 months abstinent).

Total abstinence from alcohol in the cocaine group at 6 months was 44% and for the alcohol/cocaine group was 70%. Total abstinence from marijuana and other drugs at 6 months was 33% for the cocaine-only group and 40% for the alcohol/cocaine group.

Total abstinence from alcohol at the 18-month follow-up was 25% for the cocaine-only group and 40% for the alcohol/cocaine group. Current abstinence was 25% for the cocaine only group and 50% for the alcohol/cocaine group. Total abstinence from other drugs including marijuana at the 18-month follow-up was 25% in the cocaine-only group, and current abstinence was 50%. At the 18-month follow-up, total abstinence from marijuana and all other drugs in the alcohol/cocaine group was 10% and current abstinence was 30%.

In those seven patients who relapsed on cocaine but were subsequently reported as currently abstinent from cocaine at follow-up, it was found that the relapse to cocaine was either extremely brief (1 or 2 uses) and that the patient had used a variety of support activities following the relapse to bolster abstinence from cocaine (4 cases), or that the relapse was more extensive and that the patient required re-treatment and follow-up with extensive support utilization (2 cases). One patient with a prolonged relapse followed by current abstinence from cocaine reported no use of special treatment or support. The short slips followed by subsequent abstinence from cocaine were found only for cocaine use, not for alcohol relapses.

There was one death (drug overdose) of a patient at approximately 4 months post-treatment. This patient had been treated for cocaine only. He had previously treated for alcoholism at Schick, had been abstinent for several months before seeking treatment for cocaine, and was the one patient in the cocaine-only group who received 6 aversion treatments because of a poor aversion response to the initial 5 treatments.

Table 2 shows the average times to relapse. Patients generally did participate in additional care after leaving the hospital. The majority of this care was provided by counseling (9 patients), support groups (7 patients), self-help groups (7 patients), or other support such as church or special exercise/meditation (8 patients). Three patients received additional inpatient chemical dependency treatment. One patient immediately upon discharge used his insurance benefits to enter another program (28-day group therapy) because the Schick program had been free. He then went into a halfway house for 6 months. Another patient was treated again at another Schick hospital in Washington. A third treated at three 28-day programs before finally achieving 7 months of sobriety at the time of the second follow-up.

TABLE 2- Time of Relapse and Current Abstinence of Those Who Have Relapsed

	Cocaine Only	Cocaine/Alcohol	
		Cocaine	Alcohol
# of relapse patients	5	5	6
Average time to relapse	3.4 mos.	5.1 mos.	6.9 mos.
(Range)	(1 day-6 mos.)	(1 wk-10 mo.)	(1 wk-20 mo.)
# of currently abstaining relapsers	3	3	1
Average duration of current abstinence	8.6 mos.	5.3 mos.	7 mos.
(Range)	(3-14 mo.)	(1-8 mo.)	

Although there was no association between use of alcohol post treatment and relapse to cocaine use in the cocaine only group, there was a strong association between use of alcohol and relapse to cocaine in the group treated for cocaine and alcohol. This was not significant at 6 months but was significant at the $p = .01$ level at 18 months. Table 3 shows the association between total abstinence from cocaine and total abstinence from alcohol in the two groups of patients.

TABLE 3- Relationship Between Any Alcohol Use and Relapse to Cocaine

	6 MONTHS Cocaine Use		8 MONTHS Cocaine Use	
	Yes	No	Yes	No
Cocaine only group				
Alcohol Use				
Yes	2	3	3	2
No	2	2	2	1
Total	4	5	5	3
	(n.s.)		(n.s.)	
Cocaine/alcohol group				
Alcohol Use				
Yes	2	1	5	1
No	1	6	0	4
Total	3	7	5	5
	(n.s.)		(p=.01)	

Discussion

Chemical aversion has been a part of chemical dependency treatment for over 50 years (Voegtlin, 1940; Voegtlin & Broz, 1949). Chemical aversion therapy is acceptable to patients as demonstrated by the low AMA rate in this study. The AMA rate for the Schick alcohol program has continually run at or below 10%, which compares favorably with other alcohol programs (Chemical Abuse Treatment Outcome Registry (CATOR), 1985). What the standard AMA rate for cocaine patients will be for 28-day programs is not known. The AMA rate for the patients in this study was 1 of 21 or 5%. As noted previously, 5 of the 10 patients who sought treatment for cocaine only were previously treated with aversion therapy for alcohol. The shorter length of stay associated with the aversion treatment process may play a role in patient acceptance, since it allows the patient to get back to work earlier.

In an outpatient treatment program using contingency contracting for cocaine treatment, there was a low rate of patient acceptance as reported by Anker and Crowley (1982). Only 48% of patients accepted this modality at first. The authors describe contingency contracting as an "aversive contingency." They report that this acceptance rate improved over time. Applying aversive consequences to behavior should not be confused with aversion conditioning. In aversive contingency contracting there is no direct immediate pairing of the drug with the consequence. In aversive conditioning the pairing is immediate. Delay in application of aversive consequences is known to decrease their effectiveness in suppressing unwanted behavior (Bandura, 1969).

Limitations of the Study

This is a preliminary study in which only a small number of patients participated. The patients who participated were a very select group. They first had to agree to participate in a research project, they next had to agree to take aversion therapy, and they finally had to agree to allow the research staff to contact any of three "significant others" to ascertain outcome. To what extent patients selected in this manner represent the addicted population at large is unknown. The issue of self-selection for aversion therapy is to some extent irrelevant since it is unlikely that involuntary participation in an aversion program will be mandated. Therefore, all patients who participate in those programs will be self-selected. Another limitation is the lack of a matched control group assigned to no treatment or some other form of treatment. This deficiency characterizes the vast majority of outcome studies reported in the literature (Emrick, 1975).

The present study demonstrates that chemical aversion can be used as part of a multimodal treatment program to assist patients in achieving abstinence from cocaine and alcohol. The 6-month total abstinence rates of 56% for the

cocaine-only group and 70% for the cocaine/alcohol group compare favorably with an average of 42% abstinence reported by Kleber and Gawin (1984) as an expected average outcome. This is especially true given the high follow-up rate and use of significant other validation in this study. There were virtually no disagreements between the patient and the significant other reports. The fact that the patient knew that any of three people would be contacted to corroborate his or her report may have had a beneficial effect on the veracity of reporting.

Current rates of abstinence at 6 months were 78% for the cocaine-only group. For the cocaine/alcohol group current abstinent rates were 70% for cocaine and 80% for alcohol. For comparison, Rawson, Obert, McCann, & Mann (1986), tracked 83 patients at an average period of 8 months (range 6-11) after an initial brief consultation. At the time of follow-up, they divided patients into three groups. One group had sought no specialized treatment after the initial consultation, one group had inpatient treatment, and one group had outpatient treatment. Current abstinence (return to less than once a month or no use) rates were 53% for untreated, 87% for outpatient, and 57% for inpatient. The study was based on self-report only with no collateral validation. No continuous abstinence rates were reported. In Rawson's study the current abstinence rate for all groups for alcohol was 65% and for marijuana was 37%. He found a significant ($p < .01$) association between relapse to cocaine use and return to alcohol or marijuana use. We also found an association between alcohol use and cocaine relapse, but only for the cocaine/alcohol group and that only at the second follow-up. No clear association was found for marijuana use and relapse to cocaine use.

As noted above, some comparative data exist for 6 month outcomes, but there are no studies with 18 month follow-ups with which to compare our data. While abstinence from cocaine for the first 6 months is an important benchmark, it was our intention to try to identify what could be assessed at that time which would be predictive of abstinence at the 18 month follow-up. There were no consistent demographic or pretreatment drug use variables that predicted long-term abstinence in those who had maintained abstinence at 6 months. Use of larger samples in the future will help in assessing the importance of follow-up activities to long-term abstinence. The relationship between abstinence from alcohol and its effect on cocaine use needs further assessment as well, although the association appears to be robust.

Summary

Chemical aversion therapy in this pilot study was shown to have high patient acceptability and to be associated with good patient outcomes when used as part of a multimodal treatment program. There was no conflict with the use of multiple support services as part of the follow-up care. In alcoholics with cocaine addiction, return to alcohol use was strongly associated with relapse to cocaine use.

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We would like to acknowledge the assistance of Richard Rampton, M.D., for his reviewing the electrocardiographic data, Liz Stebbins for her tireless help in preparing the protocol and seemingly unending forms, Louis Siorda, Pharm.D., for his assistance in the preparation of the substitute cocaine, Ruth Jessop, R.N., for her assistance with each step of the process, Schick Shadel treatment nurses, counseling staff, and physicians who implemented the program, and Helena Paige who undertook the 18-month follow-up.

Reprints should be addressed to Research Director, Dr. Ralph Elkins, Schick Shadel Hospital, 12101 Ambaum Boulevard, SW, Seattle, WA 98146.