

## ALCOHOLISM TREATMENT BY DISULFIRAM AND COMMUNITY REINFORCEMENT THERAPY

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**Summary**—Traditional disulfiram treatment has often been ineffective because of a failure to maintain usage. The present study with 43 alcoholics compared: (1) a traditional disulfiram treatment, (2) a socially motivated Disulfiram Assurance program and (3) a Disulfiram Assurance program combined with reinforcement therapy. About five sessions were given for each program. At the 6-month follow-up, the traditional treatment clients were drinking on most days and no longer taking the medication. The Disulfiram Assurance treatment resulted in almost total sobriety for married or (cohabitating) clients but had little benefit for the single ones. The combined program produced near-total sobriety for the single and married clients. These results indicate a promising integration of chemical, psychological and social treatment of alcoholism.

Because of the adverse physical reaction which results from drinking alcohol while under disulfiram (Antabuse<sup>(R)</sup>) medication, that drug has been widely used as a pharmacological adjunct for the treatment of alcoholism (Fox, 1967). In clinical studies, however, disulfiram has generally not been found to be as effective as might be expected (Lundwall and Baekeland, 1971). Less than 1% of the clients receiving disulfiram in one study (Lubetkin, Rivers and Rosenberg, 1971) continued to take the drug after release from a hospital. Similarly, Ludwig, Levine and Stark (1970) found only 7% of their patients continued to take disulfiram after 1 year. In spite of its widespread use and apparent incompatibility with alcohol ingestion, disulfiram is considered by many to be of unproven or equivocal clinical effectiveness (Lundwall and Baekeland, 1971).

The failure of clients to continue taking disulfiram can be considered as an example of the general problem of medication adherence, which has been found to be very sensitive to personal and social factors concerning the manner in which the drug is recommended and utilized (Blackwell, 1976). Yet, some evidence

indicates that when disulfiram adherence has been assured, drinking has been effectively reduced. Bourne, Alford and Bowcock (1966) and Haynes (1973) found favorable results when alcoholics were encouraged by the court to take disulfiram regularly under supervision of a relative or probation officer as an alternative to a jail sentence; Liebson and Bigelow (1972) and Liebson, Bigelow and Flamer (1973) obtained favorable results with alcoholic-narcotic addicts who were under methadone treatment by requiring them to take disulfiram as a condition for obtaining methadone. Bigelow *et al.* (1976) assured disulfiram maintenance by a security-deposit contracting procedure. The above studies obtained very favorable results, but unfortunately almost all were either case studies or did not include a comparable control group of alcoholics who did not receive the special medication assurance procedures. A notable exception was the study by Gerrein, Rosenberg and Manohar (1973) which included several control groups and found that drinking was greatly reduced when disulfiram was taken under office supervision twice weekly as compared with either a no-

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supervision or no-disulfiram control group. Unfortunately, data were available for only about one-third of the initial subjects even after a fairly brief (8 weeks) follow-up. In spite of the methodological problems noted in the above studies, the data suggest that the usual problems of disulfiram therapy can be avoided by some method of assuring that the disulfiram will be utilized by the patient.

One component of a behaviour therapy program (Azrin, 1976), the "community-reinforcement program", has used a method of disulfiram administration which contained several of the features employed by the above studies. Relatives were used to supervise the taking of the disulfiram; in addition, the patients took the disulfiram at each of the regularly scheduled counseling sessions. In addition, the client identified problem situations likely to cause omission of the medication and was given behavior reversal training in anticipation of the event. Clients also received a variety of other behavioral procedures which included job-finding (Azrin, Flores and Kaplan, 1975), reciprocity marital counseling (Azrin, Naster and Jones, 1973), advice on social and recreational activities, and a buddy procedure. This total program was found to be more effective than a control procedure in helping alcoholics to remain abstinent. Also, the addition of the disulfiram component to the behavioral therapy components resulted in a reduction of counseling time from 50 hr per patient (Hunt and Azrin, 1973) to 30 hr (Azrin, 1976), which still represents a substantial time commitment.

The community-reinforcement method was effective in reducing drinking by 98% at the 2 year follow-up but no conclusion was possible regarding the relative contributions of the disulfiram assurance component and the behavior therapy component. The present study attempted to evaluate the disulfiram assurance component and compare it with a traditional method of dispensing disulfiram, and with a combined community-reinforcement and antabuse assurance treatment. Also, the

duration of counseling was scheduled for 5 weekly sessions of about 1 hr duration to evaluate the feasibility of a briefer time-limited treatment program. Whereas the previous applications of this program were with inpatient clients (Hunt and Azrin, 1973; Azrin, 1976), the present study used only outpatient clients.

## METHOD

### *Subjects and experimental design*

All outpatient clients of a rural community alcoholism treatment clinic were considered as subjects. The clinic served an area in which the largest town had a population of about 10,000 persons. Clients were excluded only if the client (1) refused to take disulfiram, (2) was unable to take disulfiram for medical reasons, (3) had not resided locally for a period of 6 months, (4) had another drug dependency, or (5) was psychotic. Less than 10% of the admissions were excluded for these reasons. Forty-three clients served as subjects for the study.

The mean age of the clients was 33.9 yr old, (range 20–60). Eighty-three per cent were male, 67% were married or cohabitating, 46% were employed and the mean number of years of education was 11.2 yr. During the month prior to entering treatment, the mean number of days of self-reported drinking was 21.1 and the mean number of days intoxicated was 13.1. The mean number of ounces of ethanol taken per drinking day was 8.8. The mean number of reported years with a drinking problem was 4.4. The number of previous hospitalizations for alcoholism ranged from 0 to 7 with a mean of 0.4.

Clients were randomly assigned to one of three treatment conditions. An *F* test determined that the three groups did not differ significantly on any of the above pre-treatment characteristics. At the end of 6 months, the clients had the opportunity to receive any of the procedures of the groups to which they were not assigned. Therefore, differences between groups were assessed only for the 6-month period.

### *General procedures*

The clients in all three treatment conditions received the following procedures. The client was asked, at the time the initial counseling appointment was requested, to bring in a spouse, relative, or close friend with them. All clients filled out the standard clinic intake forms, discussed the extent and nature of their problems with a counselor and were told about and encouraged to take disulfiram. Those who were uncertain, were encouraged to try it for at least a few weeks or even days. Those who refused were given the standard agency counseling. The significant other who accompanied the client to the session was usually very influential in encouraging the client to use disulfiram. If the clients agreed to take disulfiram, they were evaluated by a physician and his staff, and if deemed medically appropriate, were given a prescription for a 30-day supply of disulfiram by the agency medical staff. The usual dosage

was 250 mg. To ensure that all clients had the disulfiram, they were asked to go to a nearby pharmacy, have the prescription filled and return immediately. All clients received a booklet and information regarding the effects of disulfiram, the precautions to be taken and a medical alert card stating that they were taking disulfiram.

All clients were scheduled to receive five weekly sessions each of which lasted 60±15 min each. They received monthly contact thereafter. All clients received educational material describing Jellinek's view of alcoholism (Jellinek, 1960), were encouraged to remain totally abstinent and to continue to take disulfiram.

#### *Recording procedures*

Each client was instructed to record their progress on a monthly calendar which they brought to each session. The self-reports included a statement of the amount and type of alcoholic beverage consumed as well as their job, arrests, institutionalization and family status. At least one other individual, who was close to the client and would have the information, was also questioned on the client's status and reviewed the client's record. This person was typically a spouse, some other close member of the family, a friend, or an employer. Also personal visits were made to the client's home or place of employment at least twice by one of the counselors. The local arrest records were examined regularly regarding the clients. Since the agency provided the local detoxification program, as well as the renewals of the disulfiram prescriptions, these records were regularly reviewed for corroboration of the drinking behavior and disulfiram usage data. Whenever there was a discrepancy, the measure which indicated the greater degree of dysfunction was considered to be correct. Sobell and Sobell (1978) and Maisto, Sobell and Sobell (1979) have replicated and extended previous findings that the self-reports of alcoholics are generally highly correlated with the reports of collaterals or with official records with regard to arrests, institutionalization, days sober and days intoxicated.

The client contact intervals were once a week for the first 5 weeks and once a month thereafter by phone or personal visit. By restricting clients in the study to those with a permanent residence locally, the clients were able to be followed-up more easily.

## TREATMENT

Beginning at the second session, the clients received differential treatment according to which of the three groups they were assigned.

#### *(1) Traditional group*

Clients in the Traditional Group received a type of treatment which is fairly common and with no special assurance procedures for taking disulfiram. They were told that taking disulfiram was their own responsibility and that they should take it daily as prescribed. They were accompanied by a significant other to the first counseling session. Five structured sessions were given devoted to education concerning alcoholism by movie films dealing with alcoholism, (Martin, 1972) and discussion of printed material describing Jellinek's view of the course of

alcoholism (Jellinek, 1960). The counselor stressed the importance of total abstinence and provided sympathetic listening to the personal and social problems presented by the client.

#### *(2) Disulfiram Assurance group*

Clients in this group were treated similarly to those in the Traditional Group except for specific training in adhering to the disulfiram regimen. The client brought in and consumed this medication at the start of every session. They were taught to take their disulfiram at a set time, place, and in the company of a significant other (spouse, roommate, employer, friend), who was encouraged to accompany the client to all sessions.

In addition, the clients role-played, with the significant other, situations in which they felt they would no longer want to take disulfiram. The significant other was given communications training (Azrin, Naster and Jones, 1973): they were taught to take the other person's point of view, avoid blame, take partial responsibility, offer to help and make positive suggestions to the client to continue to take disulfiram. They similarly role-played situations in which the significant other might no longer wish to continue to help the client to take disulfiram, and the client was also taught the above communication skills in persuading the significant other to continue to monitor the medication adherence. The Disulfiram Assurance program was presented not as a "watch dog" program, but one in which the significant other was someone who cared enough about the client to help ensure that they remained sober. If the client refused to take disulfiram, or the significant other refused to continue to participate, they were instructed to call the counselor, who in turn, urged them to reinstate the arrangement. The counselors contacted the client monthly to encourage them to continue to take disulfiram.

#### *(3) Behavior therapy plus Disulfiram Assurance Group*

Clients in this treatment condition received all the procedures in the previous "Disulfiram Assurance Group" but in addition received the behavioral training specified in the community-reinforcement program (Hunt and Azrin, 1973; Azrin, 1976). They received instructions in refusing offered drinks, abbreviated muscle relaxation training (Azrin, Nunn and Frantz, 1980) to control urges to drink, training in positive methods of dealing with difficult social situations which had previously led to the client's drinking, and advice on social and recreational activities. In addition, clients were given job-finding counseling if unemployed (Azrin and Besalel, 1980). Reciprocity counseling (Azrin, Naster and Jones, 1973) for marital or couple problems were given if alcohol consumption had affected that relationship. Socially isolated clients were encouraged and instructed to establish social relationships which might then serve as a natural deterrent for intoxication which would provide a time-out from the reinforcement in those relations. Adoption of animal pets was encouraged for the same reason, for the otherwise isolated clients.

Eight clients received reciprocity counseling procedures and seven received job-finding assistance. Less time was spent on the didactic and Antabuse Assurance procedures in order to accommodate the behavioral counseling procedures within the same 5-session format as was used for the other 2 types of counseling.

Table 1. Means, *F*-ratios and significance level for the outcome measures during the 6th month of follow-up for three different treatment programs

	Treatment condition			Anova	
	Traditional ( <i>N</i> = 14)	Disulfiram assurance ( <i>N</i> = 15)	Behavior therapy plus disulfiram assurance ( <i>N</i> = 14)	<i>F</i> -ratio ( <i>d.f.</i> 2, 41)	<i>P</i>
Disulfiram taken ( $\bar{x}$ No. of days)	0.0	19.3	24.8	17.50	<0.001
Drinking ( $\bar{x}$ No. of days)	16.4	7.9	0.9	7.14	<0.01
Alcohol consumed ( $\bar{x}$ Oz./episode)	4.1	1.7	0.7	5.98	<0.01
Intoxicated ( $\bar{x}$ No. of days)	10.0	5.0	0.4	6.09	<0.01
Unemployed ( $\bar{x}$ No. of days)	10.9	3.2	2.2	2.67	NS
Institutionalized ( $\bar{x}$ No. of days)	0.3	0.0	0.0	1.32	NS
Absent from home ( $\bar{x}$ No. of days)	4.4	0.0	0.0	2.93	NS

## RESULTS

Table 1 shows the results during the 6th month of follow-up on the 7 obtained outcome measures. The clients receiving the Traditional Treatment were no longer taking disulfiram, were drinking on about half of the 30 days, were intoxicated on about one-third of them, consumed about 4 ounces of ethanol per drinking episode, and were unemployed about one-third of the month. The clients in the Behavior Therapy plus Disulfiram Assurance program were taking disulfiram about 80% of the days, drank or were drunk less than one day per month, averaged less than one ounce of alcohol per drinking episode, and were unemployed about 2 days during the month. The clients receiving the Disulfiram Assurance program had intermediate values on these outcome measures. For none of the three treatments was there appreciable institutionalization for alcoholism, nor absence from the home. The results from the analysis of variance in the last 2 columns of the Table showed that the groups differed significantly on

all of the direct measures of drinking, especially on the taking of disulfiram but did not reach significance on the indirect measures of absence from home, unemployment or institutionalization.

Figures 1 and 2 show the time course of the changes during the first six months for the two principal measures consisting of taking disulfiram and days abstinent. It can be seen from Fig. 1 that the clients receiving the Traditional Treatment took disulfiram about two-thirds of the time during the first month, decreasing rapidly thereafter until no disulfiram was taken after 3 months. The clients in both the Disulfiram Assurance and the Behavior Therapy plus Disulfiram Assurance program were taking disulfiram about 90% of the time initially and showed less of a decrease in time. For the Traditional group and the Antabuse Assurance group, most of the decreases in taking Antabuse was at the end of the first and second month.

Figure 2 shows that during the first month the clients in all three treatments were almost

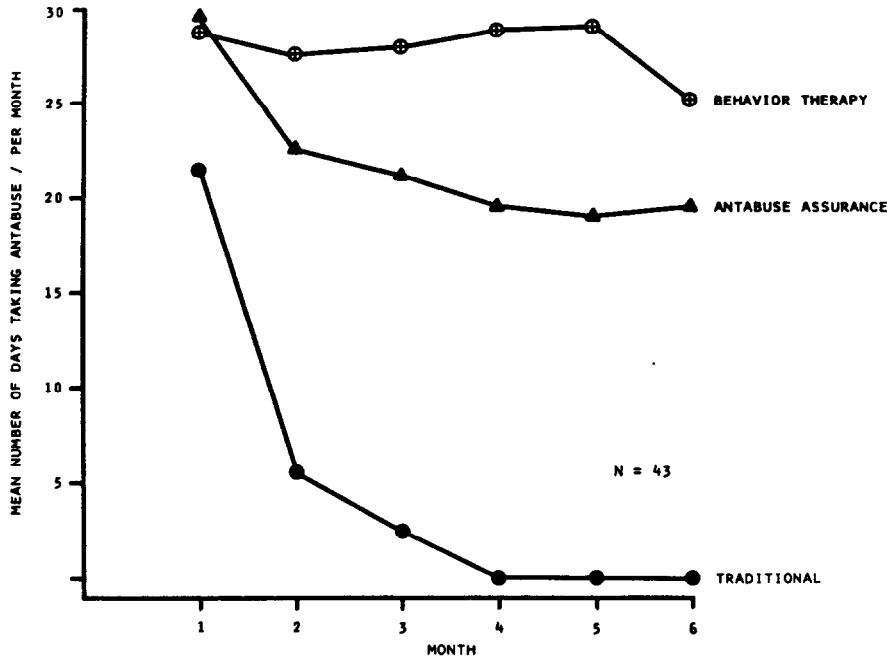


Fig. 1. Mean No. of days on which disulfiram (Antabuse) was taken during each month (30 days) of the 6 months of follow-up. Disulfiram was given in the usual manner in the "Traditional" group whereas adherence was socially motivated for the "Disulfiram Assurance" group. The "Behavior Therapy" group received community oriented reinforcement therapy in addition to the Disulfiram Assurance program.

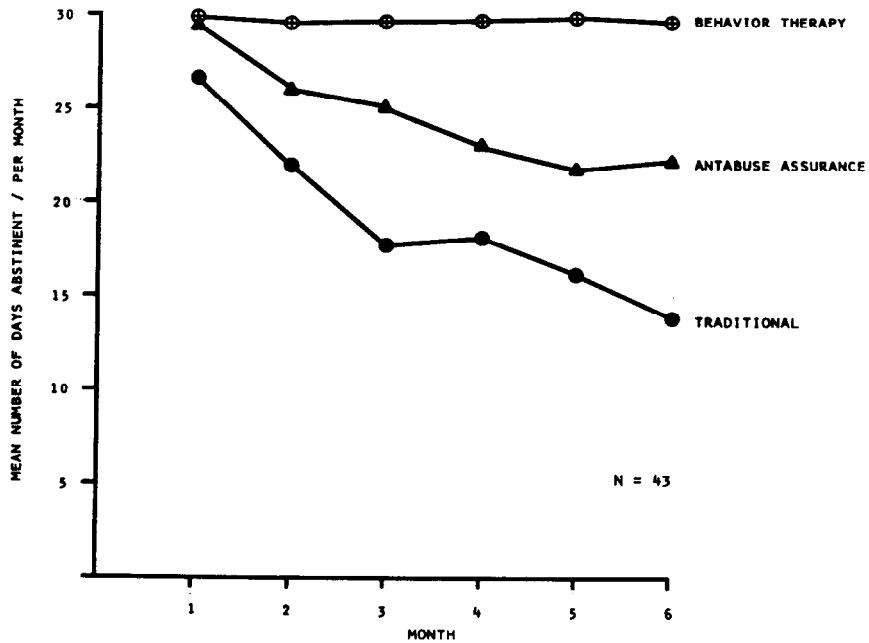


Fig. 2. Mean No. of days on which drinking occurred each month (30 days) of the 6 months of follow-up. Disulfiram was given in the usual manner in the "Traditional" group whereas adherence was socially motivated for the "Disulfiram Assurance" group. The "Behavior Therapy" group received community oriented reinforcement therapy in addition to the Disulfiram Assurance program.

entirely abstinent. Abstinence decreased especially during the first 2 months for the clients receiving the traditional treatment paralleling the decrease seen in Fig. 1 for the disulfiram usage. The clients receiving the Disulfiram Assurance showed a large decrease in abstinence after the first month paralleling the large decrease in disulfiram usage at that time seen in Fig. 1. The clients in the Combined Antabuse Assurance and Behavior Therapy condition averaged less than 1 drinking day per month for each month of the 6-month follow-up.

effect whereas the addition of the Behavior Therapy program produced nearly complete abstinence.

The mean number of sessions received was 4.9 for the Traditional, 4.5 for the Disulfiram Assurance and 6.4 for the Behavior Therapy treatment. The variation from the scheduled 5 sessions was caused by failures to attend, or to extra sessions being given when needed. The difference between groups was not statistically significant,  $F(2, 41) = 1.83$   $P > 0.05$  for the number of sessions received.

Table 2. Mean number of days abstinent during the 6th month (30 days) of follow-up

	<i>N</i> = 43	
	Singles	Couples
Traditional	6.75	17.4
Disulfiram assurance	8.0	30.0
Behavior therapy plus disulfiram assurance	28.3	30.0

Table 2 shows the relationship between the clients' marital status, their treatment condition, and their drinking at the 6th month. It can be seen that the single clients drank on more days than did those who were married, the difference being statistically significant,  $F(1, 42) = 21.71$ .  $P < 0.0001$ . An interaction also can be seen between marital status and treatment group which too was found to be statistically significant  $F(2, 41) = 6.12$   $P < 0.006$ . (This interaction, as well as the greater drinking of the single clients, was observed and found to be statistically significant for the other major outcome measures: amount of alcohol consumed, No. of days sober, and no. of days taking disulfiram.) Table 2 shows that for married clients the Disulfiram Assurance procedure was sufficient to produce nearly complete abstinence; the addition of behavior therapy procedures was unnecessary. For the single clients, however, the Disulfiram Assurance procedure had little

## DISCUSSION

The results indicated that the Traditional treatment was the least successful, the Disulfiram Assurance more effective, and the Behavior Therapy treatment the most effective. This rank order of effectiveness was found for all outcome measures: number of days drinking, number of days intoxicated, number of ounces of ethanol per drinking episode, and time away from home or institutionalized. During the first month, the clients were relatively sober but the difference between the treatment groups became greater with each passing month.

Marital status was found to be associated with the effectiveness of the treatments. As had been found previously (Gerard and Saenger, 1966), the married clients were found to drink less than the singles and this was seen here for all three treatments. An Interaction effect showed that for single clients, the Disulfiram Assurance treatment had little effect, probably because that treatment depended heavily on the social support of a partner to take the drug. The combined Behavior Therapy and Disulfiram Assurance treatment was substantially effective for the single clients, possibly because of the additional role of the counselor and the social and vocational experiences promoted by that procedure. A surprising finding was that for married clients, the Disulfiram Assurance treatment was as effective as the combined Behavior Therapy and Disulfiram Assurance. It

appears that once sobriety was achieved by the disulfiram, no additional behavior therapy, job-finding assistance, or marital counseling was needed. These clients usually obtained jobs and re-established satisfying marital and social relationships with no assistance from the counselor.

The conclusion suggested by the present data is that single clients should be given the combined behavioral Behavior Therapy and Disulfiram Assurance treatment; married clients require only the Disulfiram Assurance program.

The absolute level of effectiveness was substantial for the Behavior Therapy treatment. Drinking and intoxication averaged less than 1 day per month at the 6th month follow-up and was primarily associated with two of the clients. The mean number of sessions required was also very low, about 6 sessions, which was considerably less than the 30 sessions used in the previous application of this method in a less structured format (Azrin, 1976). Similarly, for married clients, the Disulfiram Assurance treatment resulted in virtually complete abstinence at the 6th month follow-up.

Drinking seemed to resume at two types of occasions, the first of which was at the end of one month, as seen in the data, apparently because the initial prescription for the disulfiram was not renewed. This problem was usually resolved in the Antabuse Assurance procedure by prior rehearsal and instruction during the sessions and by telephone reminders prior to that time. A second common basis for drinking was when either the client or the marital partner declined to take, or supervise the taking of, disulfiram each day. Contact by the counselor by phone was often sufficient to resume the drug-taking ritual once the counselor was alerted by the other person or by the regular reports mailed in by the clients. Both of these precursors for drinking entailed the failure to take the disulfiram regularly and indicate further the importance of the drug in maintaining sobriety as also evidenced by the

present monthly data showing a close correspondence between the taking of disulfiram and the absence of drinking.

The present study was done in a rural area, and the results may differ with urban clients. Also, the interaction seen with marital status requires replication. These questions should be pursued by studies with additional clients and in an urban setting.

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