

SPECIAL ARTICLE

A RANDOMIZED TRIAL OF TREATMENT OPTIONS FOR ALCOHOL-ABUSING WORKERS

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Abstract Background. Employee-assistance programs sponsored by companies or labor unions identify workers who abuse alcohol and refer them for care, often to inpatient rehabilitation programs. Yet the effectiveness of inpatient treatment, as compared with a variety of less intensive alternatives, has repeatedly been called into question. In this study, anchored in the work site, we compared the effectiveness of mandatory in-hospital treatment with that of required attendance at the meetings of a self-help group and a choice of treatment options.

Methods. We randomly assigned a series of 227 workers newly identified as abusing alcohol to one of three rehabilitation regimens: compulsory inpatient treatment, compulsory attendance at Alcoholics Anonymous (AA) meetings, and a choice of options. Inpatient backup was provided if needed. The groups were compared in terms of 12 job-performance variables and 12 measures of drinking and drug use during a two-year follow-up period.

Results. All three groups improved, and no significant differences were found among the groups in job-related outcome variables. On seven measures of drinking and

drug use, however, we found significant differences at several follow-up assessments. The hospital group fared best and that assigned to AA the least well; those allowed to choose a program had intermediate outcomes. Additional inpatient treatment was required significantly more often ($P < 0.0001$) by the AA group (63 percent) and the choice group (38 percent) than by subjects assigned to initial treatment in the hospital (23 percent). The differences among the groups were especially pronounced for workers who had used cocaine within six months before study entry. The estimated costs of inpatient treatment for the AA and choice groups averaged only 10 percent less than the costs for the hospital group because of their higher rates of additional treatment.

Conclusions. Even for employed problem drinkers who are not abusing drugs and who have no serious medical problems, an initial referral to AA alone or a choice of programs, although less costly than inpatient care, involves more risk than compulsory inpatient treatment and should be accompanied by close monitoring for signs of incipient relapse. (N Engl J Med 1991; 325: 775-82.)

THE field of alcoholism treatment has long been divided over how much treatment is enough and over whether and when inpatient care is justified to supervise withdrawal from alcohol¹ or manage alcohol dependence.^{2,3} Studies comparing inpatient treatment with various alternatives (such as outpatient treatment,⁴ partial hospitalization,⁵ and treatment in day-clinic settings⁶) have seldom found differences in outcome. Government and private panels⁷⁻¹⁰ and several academic reviewers^{11,12} have concluded that the cost effectiveness of inpatient rehabilitation still awaits compelling empirical justification.

Meanwhile, the number of inpatient rehabilitation programs for people with alcoholism has increased sharply.⁹ Insurance plans cover inpatient treatment preferentially, but with increasing restrictions on admissions and lengths of stay. Employers, newly conscripted into the federal government's "war on drugs,"¹³ remain uncertain about their policies toward

the rehabilitation of employees who have problems with alcohol, other drugs, or both.¹⁴

Among the forces driving the expansion of inpatient treatment for alcoholism, the rapid growth of company-sponsored employee-assistance programs has been pivotal.¹⁵ The staffs of such programs identify and assess employees' drinking problems and other problems with coping, make referrals for care, and sometimes oversee follow-up care.¹⁶ Because they are able to back up their referrals with the implicit threat of job loss, employee-assistance programs create distinct incentives for patients to enter treatment for alcoholism.¹⁷

Previous investigations have posed the question of how much alcoholism treatment is enough. In this study we examined the question at an industrial plant with 10,000 workers. We randomly assigned clients of an employee-assistance program who were newly identified as abusing alcohol to one of three alcoholism-rehabilitation regimens. The first began with a period of mandatory inpatient rehabilitation, the second began with mandatory attendance at Alcoholics Anonymous (AA) meetings, and the third gave the subjects a choice of treatment options, with nondirective advice from the administrators of the employee-assistance program. Employees in all three groups were monitored by the company for a probationary year. In this study we tracked them for a total of two years. Additional inpatient treatment was offered to employees whom the staff of the

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program judged to be having enough trouble with their drinking, after the randomly assigned referral, to be in immediate jeopardy of losing their jobs. The three treatment strategies were fundamentally different in their philosophies, in their anticipated costs, and in the manner in which and the degree to which they intruded on the workers' lives. The subjects in the three groups were compared in terms of 12 measures of job performance and 12 measures of drinking and drug use; data were collected over a two-year period beginning with the date of study entry (intake).

METHODS

Recruitment, Assessment of Eligibility, and Randomization

Subjects were recruited for the study as they entered the employee-assistance program with an alcohol problem that was interfering with their work. To be eligible, a candidate was required to be new to the employee-assistance program (even if he or she had previously been treated elsewhere), to have alcohol abuse as the primary problem, and to fall within a "gray zone" in which the company and union, relying on established exclusion criteria, were uncertain whether hospitalization was the appropriate treatment.

Employees were excluded from the study and referred directly to a hospital if they required medically supervised detoxification (because they had a blood alcohol concentration ≥ 0.2 [43 mmol per liter, or 2.0 g per liter], a definite, recent history of delirium tremens or grand mal seizures during alcohol withdrawal, or clear signs and symptoms suggesting the imminent onset of delirium tremens); if they required medical attention for a serious illness; if they posed an immediate danger to themselves or to others; if they needed psychiatric care for delusions or other gross impairments of mood, language, memory, or perception of reality; or if they would be difficult to follow up because they were about to be jailed or fired. The research and program staffs met monthly to review judgments about eligibility and to monitor compliance with the protocol.

Between February 1, 1982, and June 30, 1987, every newly identified alcohol-abusing employee who came to the attention of the employee-assistance program before being hospitalized was screened for eligibility. Of these 371 employees, 128 (35 percent) were ineligible according to the exclusion criteria; the remaining 243 (65 percent) were escorted by a member of the employee-assistance-program staff to an interview with one of the study personnel, who administered an alcohol breath test to ascertain the worker's eligibility (blood alcohol concentration < 0.2 [43 mmol per liter, or 2.0 g per liter]) and competence to give informed consent and to confirm the reliability of self-reported data (blood alcohol concentration < 0.1 [22 mmol per liter, or 1.0 g per liter])¹⁸; if these criteria were met, written informed consent for participation in the study was obtained.

Altogether, 227 subjects (93 percent of all those eligible) consented to participate and were randomly assigned to treatment groups. Both interviewers and subjects were blinded to group assignment during intake. The staff of the employee-assistance program told clients about their referral assignments. This separation between research and program staffs reinforced the policy that nothing revealed in the study interviews would affect treatment or job decisions.

Rehabilitation Strategies

Of the 227 subjects, the 73 assigned to "compulsory hospitalization" were required to undergo inpatient treatment of about three weeks' duration. Nine refused hospitalization and were continued for purposes of analysis in the hospital group. For the remainder, the average length of stay at the 10 hospitals (of which 2 accounted for 86 percent of the hospital assignments) was 23 days. The participating hospitals described their programs in similar terms, were accredited by the Joint Commission on Accreditation of Hospitals, held AA meetings at the hospital, and cited abstinence as the goal of treatment. The hospital stay was followed by a year of job proba-

tion, during which attendance at AA meetings on a regular basis (at least three times a week), sobriety at work, and weekly checks with the employee-assistance-program staff were required.

The 83 subjects assigned to "compulsory AA only" were referred and offered an escort to a local meeting of AA, which they were advised to continue attending — daily, if possible, but not less than three times a week — for at least a year. They were treated in the same way as subjects in the hospital group for the year after discharge.

The third treatment option — referred to as "choice" — was one that involved the subjects in the planning of their treatment; such involvement could theoretically influence outcome if choice enhances the subject's sense of "self-efficacy,"¹⁹ facilitates the appropriate matching of subjects to treatment,²⁰ or both. The subjects randomly assigned to a choice of treatments were not required to join AA or enter a hospital, although the staff of the employee-assistance program sometimes encouraged them to do one or the other, and were free to elect no treatment, as long as they remained sober on the job, performed acceptably, and checked in weekly with the employee-assistance program. Of the 71 subjects in the choice group, 29 elected hospitalization in a total of five hospitals (average length of stay, 24.5 days), 33 went directly to AA, 3 chose outpatient psychotherapy (with a social worker, a psychiatrist, or a marriage counselor), and 6 opted for no organized help at all.

All three treatment protocols authorized the staff of the employee-assistance program to recommend supplementary hospital treatment for a participant who was not succeeding with his or her randomly assigned treatment; such decisions were made on the basis of data collected by the program (not study data). The criteria for the additional treatment, specified in advance, were intoxication at work or a pattern of unexcused absenteeism in combination with imminent job termination for alcohol-related infringements of company policy and rules. Subjects who underwent additional treatment were retained for purposes of analysis in their original treatment groups, and the reasons for additional treatment were monitored in regular monthly meetings of the research and program staffs.

Data Collection

Subjects were interviewed at study entry and 1, 3, 6, 12, 18, and 24 months thereafter. Three interviews each were scheduled with job supervisors and spouses or close friends or relatives, when possible. At intake, 201 supervisors and 61 spouses or others were interviewed; after one year, 162 and 44, respectively, were interviewed; and after two years, 111 and 32. The trained research interviewers were independent of the staff of the employee-assistance program and unaware of the subjects' group assignment.

Intake

A structured, face-to-face, 90-minute intake interview was used to obtain data on descriptive characteristics of the subjects and to establish base-line values for dependent variables. Included were a lifetime history of drinking (covering volume, variability, and problems) and a history of previous treatment. Base-line status was determined for the following covariates: job, family, and health histories; circumstances and sources of stress, support, and satisfaction; current and past use of prescription and street drugs and cigarettes; and diet, weight, and exercise. Drinking practices and associated problems were catalogued, and the subjects were located on diagnostic scales. For alcoholism, these included the Short Michigan Alcoholism Screening Test (SMAST),²¹ the Iowa Stages Index,²² and the Rand drinking-symptoms checklist,²³ which codifies diagnostic criteria developed by the National Council on Alcoholism.²⁴

Coexisting medical and psychological disorders were assessed through the subjects' reports, with the use of sections of the Diagnostic Interview Schedule of the National Institute of Mental Health²⁵ and the American Psychiatric Association's *Diagnostic and Statistical Manual of Mental Disorders*, third edition (DSM-III),²⁶ to identify physical and psychological symptoms and the alcohol dependence syndrome, and the Depressive Symptomatology Scale of the Center for Epidemiological Studies (CES-D)²⁷ to measure depressed mood and related dysfunction in the previous week.

Intake interviews with supervisors and spouses or others focused on the subjects' level of functioning and drinking at work and at home. Job supervisors were asked to rate the subjects' performance, both overall and in terms of specific variables, in the past year and past month, to report disciplinary actions taken, and to report any evidence of drinking or intoxication on the job. Spouses, relatives, or friends reported on the quality of marital and other interpersonal and parenting relations, estimated the volume and variability of the subjects' drinking, and described their own alcohol use.

Follow-up

Follow-up interviews focused on dependent variables and selected covariates; items and scales from the intake interview were used. Archival data were collected from the records of the employee-assistance program and the hospital, insurance-carrier claims files, and a computerized payroll system maintained at the plant. As Table 1 shows, we divided outcome variables into indicators of treatment effects related to job performance and those related to drinking and drug use.

Statistical Analysis

The cardinal job-related outcome variable studied was the length of time to being fired for unacceptable performance; life-table survival analyses²⁸ and proportional-hazards models²⁹ were used to evaluate this variable. Other job outcomes were assessed with use of the chi-square test for categorical variables and analysis of variance for continuous outcome measures. We included data collected at each of five follow-up interviews (those at 3, 6, 12, 18, and 24 months), omitting the 1-month interview because subjects in the hospital group spent most of that period off the job and away from alcohol.

Among drinking-related outcomes, the length of time to hospitalization for supplementary treatment of uncontrolled drinking was evaluated with use of life-table survival analyses and proportional-hazards models. Self-reported measures of drinking, also obtained at each of the five follow-up interviews included in the analysis, were first assessed with the chi-square test and analysis of variance. We then controlled for covariates in stepwise multiple-regression analyses — logistic for categorical dependent variables (any drunkenness, blackouts, binges, serious symptoms, cocaine use, and definite alcoholism), and linear for continuous outcome measures (the Iowa and Rand indexes and the average daily number of drinks). Next, we conducted repeated-measures analyses of variance on self-reported drinking measures and evaluated the effects of time, group, and time-by-group interactions. Finally, we compared groups in terms of the set of drinking measures simultaneously, using multivariate analysis of variance.

RESULTS

The Sample

The majority of the subjects were men (96 percent), were in their 30s (mean age, 33 years), were white (90 percent), and were blue-collar workers in skilled and semiskilled jobs. (A table summarizing the characteristics of the subjects at intake according to treatment group is available elsewhere.*) The subjects were drinking heavily, and all had many alcohol-related problems. They averaged 6.3 drinks a day and 19.8 drinking days in the month preceding the interview; 21 percent had been drunk daily and another 45 percent weekly during the previous month; 24 percent reported at least one binge in the previous six months,

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Table 1. Outcome Measures.

Measures of job performance
Objective data from company and study records
Involuntary termination for unacceptable job performance
Self-reported data from interviews with subjects*
Problems with supervisors
Warning notices
Drinking on the job
Accidents on the job
Any accidents (on or off the job) after drinking
Absenteeism because of drinking
Supervisors' assessments from interviews*
Quality of job performance
Job-performance score (9 items)†
Drinking on the job
Intoxication at work
From computerized company payroll files
Hours missed from work
Measures of drinking and drug use
Objective data from company and study records
Referral for supplementary inpatient treatment
Self-reported data from interviews with subjects*
Any drinking
Number of drinking days in the previous month
Average daily number of drinks
Intoxication (one or more episode)
Binges (one or more drinking episodes lasting ≥24 hours)
Blackouts (memory lapses)
Score on the Iowa Stages Index‡
Overall impairment (Rand score)§
Serious symptoms (Rand score)§
Definite alcoholism (Rand score)§
Cocaine use in the previous six months

*Covering the period between interviews, 3, 6, or 12 months.

†The following items were included in the job-performance score: attendance, dependability, initiative, attitude toward work, ability to work with minimal supervision, ability to get along with others, quality of work, aptitude, knowledge of the job, and rating on a 5-point scale from "unsatisfactory" to "excellent"; scores ranged from 9 to 45.

‡The Iowa Stages Index measures the intensity of current use of alcohol. It incorporates life problems to which drinking has contributed; drinking to cope with personal feelings; preoccupation with drinking; and loss of control over the amount consumed when drinking. In the summary statistics, respondents are stratified according to the number of times they qualify on any one of these four scales and thus are classified along a continuum of "stages" from "nonalcoholic" (qualified on none of the scales) to "very-late-stage alcoholic" (qualified on all four).

§The Rand behavioral index measures the extent of drinking. The average behavior-impairment score summarizes responses to a series of questions and indicates the overall severity of a drinking problem. Scores range from 0 to 60.²⁶

and 25 percent three or more blackouts. More than 90 percent were scored as "alcoholic" on the SMAST, 77 percent were scored as "definitely alcoholic" on the Rand behavioral-impairment index, 57 percent were classified as late- or very-late-stage alcoholics on the Iowa Stages Index, and 56 percent were rated "alcohol dependent" according to the DSM-III criteria. Over half had been arrested at least once for driving while intoxicated, and 41 percent for other drinking-related offenses. Three quarters were current smokers and two thirds reported use of other drugs in the past six months, mostly marijuana (59 percent), cocaine (39 percent), or both; 30 percent of all subjects and half the cocaine users said they had had a "drug problem" at some time. Thirteen percent reported alcohol-related medical problems in the previous year. The subjects' mean score of 26.7 on the CES-D indicated clinically meaningful levels of current depressive symptoms.

To assess whether the randomization process produced similar groups, we compared the three groups

in terms of more than 60 base-line characteristics that might affect study outcomes. The two significant differences among the groups could have occurred by chance alone: subjects randomly assigned to hospital treatment were the most likely and those in the choice group were the least likely to be divorced or separated and to report drinking in spite of illness. Controlling for these differences in no way altered the overall results.

Attrition

We followed up all 227 enrollees in terms of company-documented outcomes in the areas of job performance (time to termination) and drinking (time to additional treatment). Ten subjects were lost to follow-up by interview from the hospital group (14 percent), 10 from the AA group (12 percent), and 7 from the choice group (10 percent); these differences were not significant. The lowest percentage of subjects included at any of the follow-up interviews was 84 percent. When the 27 subjects lost to follow-up were analyzed according to group, there was a significant difference in only one of the more than 60 intake variables. The subjects lost to follow-up from the hospital group were significantly more depressed (mean CES-D score, 29.8) than those lost from the AA group (19.6) or the choice group (19.7; $P = 0.02$). The base-line depression score was not found to be a significant predictor of treatment outcome in multiple regression analyses. Three subjects died during the two-year follow-up period, two in the hospital group (one by homicide and one by suicide) and one in the AA group (of a heart attack).

Job Outcomes

Altogether, 31 subjects were fired during the two-year follow-up period: 13 percent of the AA group, 17 percent of the choice group, and 11 percent of the hospital group; log-rank tests indicated no significant differences among the groups. The subjects in all three groups showed substantial and sustained improvement in all aspects of job functioning. (Additional data on drinking-related and job-related outcome measures are available elsewhere.*) Less than 15 percent reported job problems at the 24-month follow-up, and 76 percent of the supervisors interviewed at that time rated the subjects' job performance "good" (42 percent) or "excellent" (34 percent). The proportions with warning notices dropped from 33 percent at intake to under 2 percent at months 3 and 6 and stayed under 5 percent thereafter. The number of hours recorded by the company as missed from work dropped by more than a third in all the groups when we compared the six months before intake with the last six months of follow-up two years later. On none of our 12 job outcomes did we find any significant dif-

ferences among the groups, nor did we find any in pairwise group comparisons, at any follow-up point. Logistic-regression analyses on a composite index of job problems yielded no significant effects of group assignment.

Drinking Outcomes

A total of 46 subjects (23 percent) reported an unbroken record of abstinence from alcohol at every follow-up interview during the 24 months of the study. All three groups had substantial and fairly stable improvement on all 11 of the self-reported measures of drinking (Table 1), with some deterioration over time. On four of the measures of drinking (mean number of daily drinks, number of drinking days per month, binges, and serious symptoms), we found no significant differences among the three groups at any follow-up point.

On the remaining eight measures of drinking and drug use (any drinking, intoxication, blackouts, Iowa stage, Rand impairment score, definite alcoholism, cocaine use, and time to additional treatment), however, there were statistically significant differences among the three groups at one to four follow-up points. In terms of all but two of these measures, the hospital group had the fewest problems (in terms of Iowa stage at months 12 and 24 and cocaine use at month 18, the choice group had the fewest problems). On most, the compulsory AA group did the least well. In two-way comparisons, the choice group did significantly less well than the hospital group in terms of six of the measures of drinking at one or more follow-up points. The hospital group was significantly more likely to include continuous abstainers (37 percent vs. 17 percent for the choice group and 16 percent for AA only). Figure 1 shows the cumulative rates of abstinence from drinking according to treatment group, and Figure 2 shows the cumulative proportion of subjects who were never intoxicated during follow-up; the differences among the groups were statistically significant ($P = 0.002$). At the 12-month and 24-month assessments, the rates of AA affiliation and attendance in the past 6 months did not differ significantly among the groups.

Figure 3 shows the cumulative proportion of subjects who did not require hospitalization for additional treatment, according to initial treatment assignment. Of the 227 subjects randomly assigned, 42 percent were hospitalized for additional treatment: 23 percent of the hospital group, 38 percent of the choice group, and 63 percent of the AA group. The log-rank test confirmed that these differences were significant ($P = 0.0001$). We conducted a number of specific analyses and detected no systematic bias in the referrals for additional treatment.

Other Drugs and Group Outcomes

The compulsory AA group fared least well overall. In addition, patients who were abusing cocaine, together with alcohol, did especially poorly in the AA group (a few went to Narcotics Anonymous [NA]). Cocaine use in the past six months was reported at

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intake by 90 subjects.³⁰ Outcomes differed according to treatment assignment for the 78 of these 90 cocaine users who were followed for two years: the 22 assigned to the hospital group were significantly more likely, at every follow-up assessment, to be abstaining from alcohol than those assigned to the other groups, were less likely to report episodes of intoxication, and were found to be less impaired on the Iowa and Rand scales at three and six months. The 30 cocaine users who were assigned to the AA group had the most evidence of problems on these measures of drinking, and they were the most likely, at every follow-up assessment, to report the continued use of cocaine; this difference was significant ($P = 0.002$) at 18 months, notwithstanding the small numbers (17 cocaine users

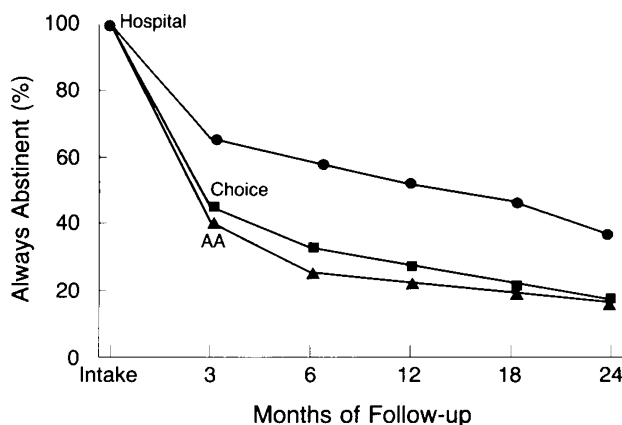


Figure 1. Rates of Continuous Abstinence from Drinking, According to Treatment Group, during 24 Months of Follow-up.

These results were obtained by life-table analysis of 200 subjects followed by interview; a total of 46 subjects reported an unbroken record of abstinence at every follow-up assessment. Differences between the groups were significant by the log-rank test ($P = 0.002$). In two-way comparisons, the hospital group had a significantly lower rate of relapse than the AA group ($P = 0.005$) or the choice group ($P = 0.0018$), and the differences between the choice and AA groups were not significant ($P = 0.9848$).

in the AA group, 5 in the hospital group, and 4 in the choice group).

As a reflection of their more serious problems, the subjects who reported at intake that they had used cocaine in the past 6 months were significantly more severely impaired than the others at the 24-month interview, and they were significantly more likely to have been hospitalized for additional treatment. As Table 2 shows, this likelihood varied according to group; of the cocaine-using subjects in the hospital and choice groups, less than 30 percent underwent additional inpatient treatment, as compared with 63 percent of the cocaine users randomly assigned to AA alone.

Costs of Treatment

Table 3 shows estimates of the costs of inpatient alcoholism treatment for the three study groups and for the hospital and AA subgroups of the choice arm, assuming inpatient costs of \$400 per day. This analy-

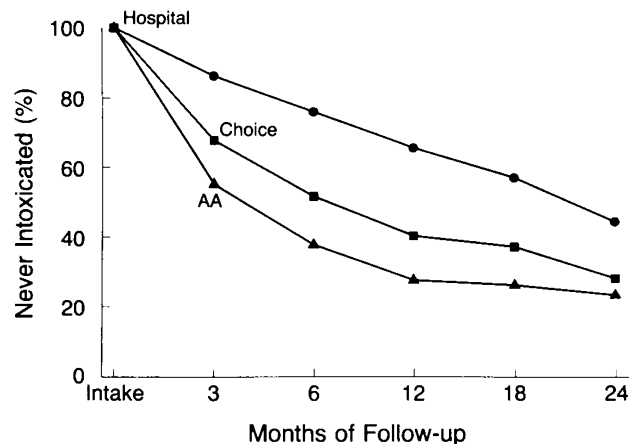


Figure 2. Rates of Continuous Sobriety, According to Treatment Group, during 24 Months of Follow-up.

These results were obtained by life-table analysis of 200 subjects followed by interview; a total of 67 subjects had an unbroken record of no reported intoxication at any follow-up assessment. Differences between the groups were significant by the log-rank test ($P = 0.002$). In two-way comparisons, the hospital group had a significantly lower rate of intoxication than the AA group ($P = 0.0005$) or the choice group ($P = 0.0148$), and the differences between the choice and AA groups were not significant ($P = 0.2701$).

sis included not only the first additional treatment (which appears in Fig. 3), but all subsequent inpatient days for treatment of alcoholism during the two years of follow-up. It did not take account of time lost from work, outpatient treatment, and other costs beyond hospital days.

When we compared the costs of treatment for the AA and hospital groups, we found that the costs for the AA group averaged \$1,200 less per person, a sav-

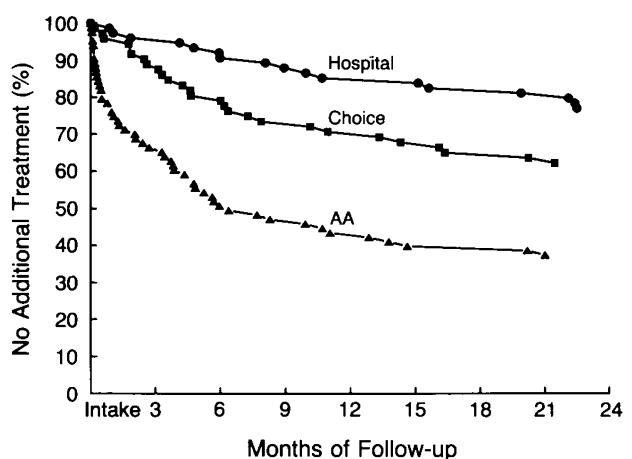


Figure 3. Time to Hospitalization for Additional Treatment, According to Treatment Group.

These results were obtained by life-table analysis of 227 subjects. A total of 96 subjects (42 percent) underwent additional inpatient treatment. Differences between the groups were significant by the log-rank test ($P = 0.0001$). In two-way comparisons, with use of life-table analyses, the subjects in the AA group were significantly more likely ($P = 0.005$) and those in the hospital group significantly less likely ($P = 0.039$) to require additional treatment than those in the choice group.

ing of just 10 percent. Even though the initial referral to AA was free, the AA group had much higher rates of additional treatment; 63 percent of subjects randomly assigned to AA eventually required hospitalization. The average cost for the choice group was almost identical to that for the AA group, because more subjects in that group than in the hospital group ultimately needed additional inpatient treatment.

DISCUSSION

Employees who had serious problems with alcohol improved materially, in terms of both drinking behavior and job performance, in the months after an intervention at the workplace. At the exit interview two years after intake, 41 percent said they were abstaining entirely from alcohol, and 23 percent had reported continuous abstinence at each of five interim checkpoints. Subjects' own reports of abstinence are, of course, somewhat suspect,³¹ but our findings are supported by the fact that the supervisors or spouses (or other close relatives or friends) of self-reported abstainers confirmed their accounts in 85 percent of the cases.

By the end of the study, daily drinking volume (averaged for all the subjects, including abstainers) had dropped from 6.3 to 1.5 drinks and the average number of drinking days in the month before the interview had dropped from 19.8 to 3.1. The proportion classified as definitely alcoholic on the Rand index dropped from 77 percent to 11 percent, that classified as alcohol-dependent according to the DSM-III criteria fell from 56 percent to 14 percent, and the rate of binge drinking was reduced from 24 percent to 6 percent.

Job problems diminished markedly and, despite a tendency of the subjects to regress, never returned to the levels before the intervention. The proportion re-

Table 3. Hospital Days and Estimated Costs of In-Hospital Treatment for Alcoholism, According to Treatment Group.*

MEASURE	COMPULSORY AA (N = 83)	NONHOSPITAL TREATMENT (N = 42)†	CHOICE HOSPITAL TREATMENT (N = 29)	ALL (N = 71)	COMPULSORY HOSPITAL (N = 73)
Probability of initial hospitalization	0	0	1.0	0.41	0.88‡
Length of initial hospital stay (days/person)	0	0	24.5	10.0	19.6§
Probability of 1 additional in-hospital treatment	0.63	0.45	0.28	0.38	0.23
Probability of ≥2 additional in-hospital treatments	0.24	0.05	0.14	0.08	0.04
Additional treatment days/person	22.1	13.2	10.7	12.2	5.5
Total hospital days/person (initial stay and all additional treatments)	22.1	13.2	35.2	22.2	25.1
Cost¶	\$8,840	\$5,280	\$14,080	\$8,800	\$10,040
Savings over compulsory hospitalization	\$1,200	\$4,760	-\$4,040	\$1,190	—

*During the two-year follow-up period.

†Nine subjects in the choice group chose nonhospital options other than AA.

‡Nine subjects refused hospitalization and were continued in the group for purposes of analysis.

§Length of stay is calculated against the denominator of 73, including the 9 subjects who refused hospitalization. The average length of stay for the 64 hospitalized subjects was 23 days.

¶Cost was calculated as \$400 per day.

porting job problems ranged from 12 percent to 35 percent at intake and had dropped to less than 12 percent or much lower on all indicators at three months. The rates rose gradually thereafter but never again exceeded 12 percent for any job problem, even a full two years after intake. Supervisors' evaluations and formal payroll records substantiated the pattern of improved performance and attendance at work.

We found no differences among the three groups in any job outcome, including being fired. All three groups evidently brought their drinking problems under sufficient control at work for group differences in job performance to be rendered statistically insignificant. But compulsory hospitalization with AA follow-up addressed drinking problems significantly more effectively than did compulsory AA alone. The results of choice were intermediate between the two. The relatively low rate of relapse in the hospital group was an unexpected finding.

This study had limitations that should be borne in mind. First, a larger sample would have bolstered our confidence in the absence of differences in job outcomes and permitted fuller investigation of differences among subgroups of the choice group and of interactions between subjects and treatments. Second, because the study spanned seven years, a cohort effect in the workers enrolled and in historical events might have influenced the outcomes. The randomization process should have distributed these influences evenly among the three groups, and in several analyses we found scant evidence of cohort effects at follow-up. Third, the reliability of self-reported data on drinking behavior is always a concern in the absence of physiologic validation of drinking status.³² We had independent accounts from supervisors and spouses or friends when available, as well as administrative records of absenteeism and use of medical care. These

Table 2. Outcome Measures at 24 Months for Cocaine Users, According to Treatment Group.*

MEASURE	HOSPITAL	AA	CHOICE	P VALUE
	percent			
Any drinking†	41	80	62	0.020
Any intoxication	32	77	54	0.005
Additional treatment‡	18	63	27	0.001

*Included in this table are measures on which subjects who reported cocaine use (in the previous 6 months) at intake differed significantly at 24 months according to treatment assignment.

†In the previous six months.

‡Hospitalization for additional treatment because of uncontrolled drinking in the previous 24 months.

provided some validation of the subjects' reports and some assurance that the rates of underreporting did not differ among the groups. Fourth, there was almost certainly some variability in the quality of care rendered in the 10 participating hospitals and some diversity among the many local AA groups involved. Our goal was to compare three distinct referral strategies and not to monitor the specific content of care in great detail. The one-month treatment interviews showed that the hospitalized patients received a fairly homogeneous package of therapeutic interventions, and we found no significant differences in any measures of drinking when we compared the two principal hospitals to one another and to the remaining eight combined.

The generalizability of these results may also be somewhat limited. The sample was a white, working-class, largely male population working in heavy industry, performing skilled, semiskilled, and unskilled work for a unionized New England plant of a very large American firm. We followed the subjects for two years, but the initial differences among the groups could erode with time. Finally, it should be underscored that our finding that AA alone was less effective than hospitalization followed by AA is specific to an employment setting where the compulsory referral to AA, or even its selection from a menu of alternatives, occurred against a backdrop of threatened job loss if drinking continued. Motivation in such circumstances may be very different from that of a drinker who enters the "fellowship" voluntarily, although some element of coercion or crisis often precipitates attendance at AA meetings.³³

Balancing its limitations, the study had important strengths, and we can say with considerable confidence that, all things considered (and contrary to our expectations), the higher-cost inpatient intervention produced superior results, even when we controlled for cocaine use at intake in multiple regression analyses. To a company or union counselor or a clinician advising patients, our findings argue for hospitalizing problem drinkers who are also using cocaine or other drugs. For other problem drinkers with reasonable job stability and no serious medical needs, an initial referral to AA (or the offer of a choice of treatment) is somewhat less costly (about 10 percent), but it entails extra risk. Employees sent only to AA, and those offered choices, are more likely to have their drinking problems resurface. The less costly intervention may be more efficient in the longer term if the money saved is spent to identify and refer more substance-abusing employees or if nonhospital options encourage seeking help. But if AA alone is mandated, or if choice is offered, our study shows that close monitoring is essential, because many employees have serious relapses in the first six months.

This study raises questions about the continuation of employees recovering from alcoholism in jobs where safety is a factor, since drinking problems reappear before job problems do. How companies should resolve this issue remains a topic for future research, but close monitoring is certainly warranted during at

least the first year of any employee's recovery process.

Alternatives to the hospital other than AA need to be evaluated systematically. Structured outpatient programs, case management, and matching strategies might make it safer to use inpatient treatment as a last resort, but these possibilities remain to be tested. Finally, this study demonstrates the feasibility of conducting tightly controlled trials to address unanswered questions about managing substance abuse at work. Randomization can be acceptable to both organizational decision makers and subjects themselves. Once cooperation is secured, the focus on the work setting may facilitate successful follow-up, which is often a difficult task in alcohol-related research.

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