

Some Medical Inpatients With Unhealthy Alcohol Use May Benefit From Brief Intervention*

RICHARD SAITZ, M.D., M.P.H.,[†] TIBOR P. PALFAI, PH.D.,[†] DEBBIE M. CHENG, SC.D.,[†] NICHOLAS J. HORTON, SC.D.,[†] KIM DUKES, PH.D.,[†] KEVIN L. KRAEMER, M.D., M.SC.,[†] MARK S. ROBERTS, M.D., M.P.P.,[†] ROSANNE T. GUERRIERO, M.P.H.,[†] AND JEFFREY H. SAMET, M.D., M.A., M.P.H.[†]

Clinical Addiction Research and Education (CARE) Unit, Section of General Internal Medicine, Department of Medicine, Boston Medical Center and Boston University School of Medicine, and Youth Alcohol Prevention Center and Department of Epidemiology, Boston University School of Public Health, Boston, Massachusetts

ABSTRACT. Objective: Studies of alcohol brief intervention for medical inpatients have mixed results. We explored potential moderators of the effectiveness of brief intervention for unhealthy alcohol use among medical inpatients. **Method:** This is a secondary analysis of a randomized controlled trial of brief motivational counseling among 341 urban-hospital medical inpatients (99 women) with unhealthy alcohol use. Self-reported main outcomes were receipt of alcohol treatment by 3 months in subjects with dependence and change in the mean number of drinks per day 3 and 12 months after enrollment in all subjects. **Results:** Among subjects with dependence, the effect of brief intervention on receipt of alcohol treatment differed significantly by gender and age ($p = .02$ for each interaction). In stratified analyses, brief intervention was associated with receipt of alcohol treatment in women (adjusted odds ratio [AOR] = 3.9, 95% confidence interval [CI]: 1.2-12.7), and younger (<44 years) subjects (AOR = 3.6, 95% CI: 1.3-10.1). Among subjects with nondependent, unhealthy alcohol use, brief intervention

was significantly associated with fewer drinks per day and better physical health-related quality of life at 3 months. However, among those with dependence, intervention was associated with worse physical health-related quality of life and more hospital use, and no changes in drinking. In adjusted analyses among those with and without dependence, brief intervention was not associated with mental health-related quality of life, alcohol problems, or readiness to change. Effects of brief intervention on consumption outcomes were not consistently moderated by demographic characteristics, comorbidity/health, or readiness to change. **Conclusions:** Some medical inpatients with unhealthy alcohol use, particularly women, younger adults, and patients without dependence may benefit from brief intervention. Few factors that were expected to moderate brief intervention effects did so. Additional research should assess which medical inpatients, if any, can benefit from brief intervention. (*J. Stud. Alcohol Drugs* 70: 426-435, 2009)

PROFESSIONAL ORGANIZATIONS RECOMMEND screening and brief intervention for all adults with unhealthy alcohol use (i.e., the spectrum from drinking risky amounts through dependence; Institute of Medicine, 1990; U.S. Preventive Services Task Force, 2004). Brief intervention, however, has proven efficacy in decreasing alcohol consumption and related consequences only in outpatients with unhealthy, but not dependent, alcohol use (Wilk et al., 1997). Further, the results from studies of the efficacy of brief intervention among other populations, such as hospitalized patients, are unclear and sometimes negative, as reported in several large randomized trials (Emmen et al., 2004; Freyer-Adam et al., 2008; Saitz et al., 2007).

Many factors may moderate the efficacy of brief intervention. Younger adult women and patients with an alcohol-attributable diagnosis (e.g., alcoholic hepatitis) might benefit more than others from intervention (Blow et al., 2006; Weisner et al., 2001). Race and ethnicity may affect receipt of alcohol-treatment services (Schmidt et al., 2007), and cognitive impairment may lower adherence to alcohol treatment (Bates et al., 2006). In an emergency department brief intervention, stage of change and self-efficacy did not appear to moderate brief intervention effects on consumption, whereas the patient's attribution of injury to alcohol did moderate these effects (Walton et al., 2008). Similarly and perhaps surprisingly, in another study (with a pre-/post-

Received: January 24, 2008. Revision: September 29, 2008.

*This study was supported by National Institute on Alcohol Abuse and Alcoholism grant RO1 12617 and National Center for Research Resources, General Clinical Research Center grant M01 RR00533.

[†]Correspondence may be sent to Richard Saitz, Boston Medical Center, 801 Massachusetts Avenue, 2nd Floor, Boston, MA 02118 or via email at: rsaitz@bu.edu. Tibor Palfai is with the Youth Alcohol Prevention Center, Boston University School of Public Health and the Department of Psychology, College of Arts and Sciences, Boston University, Boston, MA. Debbie Cheng is with the Clinical Addiction Research and Education (CARE) Unit, Section of General Internal Medicine, Department of Medicine, Boston Medical Center and Boston University School of Medicine and the Department

of Biostatistics, Boston University School of Public Health, Boston, MA. Nicholas Horton is with the Department of Mathematics and Statistics, Smith College, Northampton, MA. Kim Dukes is with DM-STAT, Inc., Malden, MA. Kevin Kraemer is with the Division of General Internal Medicine, University of Pittsburgh School of Medicine, Pittsburgh, PA. Mark Roberts is with the Division of General Internal Medicine, Section of Decision Sciences and Clinical Systems Modeling, University of Pittsburgh School of Medicine, Pittsburgh, PA. Rosanne Guerriero is with the Lahey Clinic, Burlington, MA. Jeffrey Samet is with the Clinical Addiction Research and Education (CARE) Unit, Section of General Internal Medicine, Department of Medicine, Boston Medical Center and Boston University School of Medicine and the Department of Social and Behavioral Sciences, Boston University School of Public Health, Boston, MA.

design) the presence or absence of dependence did not appear to affect changes in drinking after brief intervention (Guth et al., 2008). However, many hospital studies that support the use of brief intervention exclude patients with characteristics that may decrease the intervention's effectiveness (e.g., psychiatric comorbidity, other drug use), despite the fact that these patients represent the population identified by alcohol screening (Chick et al., 1985; Heather et al., 1996; McManus et al., 2003). In the few inpatient studies on brief intervention that have included the broad spectrum of patients with unhealthy alcohol use, results generally have been negative (Saitz et al., 2007; Watson, 1999). Therefore, it is likely that brief intervention has efficacy only in certain people and settings.

Despite this limited efficacy, large and well-funded federal efforts are underway to implement brief intervention for all patients with unhealthy alcohol (and drug) use (Center for Substance Abuse Treatment, 2007). In addition, few studies have examined moderators of brief intervention efficacy, and none (to our knowledge) have done so in hospitalized patients. Therefore, to help clarify the effects of brief intervention among medical inpatients and to study moderators of these effects, we explored data collected as part of a randomized controlled trial involving a broad spectrum of patients with unhealthy alcohol use that did not support the efficacy of brief intervention in the study group overall. We examined whether demographic factors, alcohol use severity (dependence), health/comorbidity, and readiness to change moderated the intervention's effects on receipt of treatment, alcohol consumption, alcohol problems, readiness to change, health-related quality of life, and health care use.

Method

Subjects

As described previously (Saitz et al., 2007), we enrolled 341 adult subjects (99 women) from the medicine service of a large, urban teaching hospital. Eligibility criteria included current (past-month) drinking of risky amounts (defined for eligibility as >14 standard drinks per week or ≥ 5 drinks per occasion for men; >11 drinks per week or ≥ 4 drinks per occasion for women and people age ≥ 66 years); 2 contacts to assist with follow-up; no plans of moving from the area in the next year; and a Mini-Mental State Examination score of 21 or more (Folstein et al., 1975; Smith et al., 2006). Eligible subjects who enrolled in the clinical trial provided written informed consent. The Institutional Review Board of the Boston University Medical Center approved this study.

Assessments

Research associates interviewed subjects before randomization to assess the characteristics listed in Table 1. One co-

author (R.S.) reviewed medical records to determine current primary and alcohol-attributable medical diagnoses (Adams et al., 1993). At 3 and 12 months, research associates reassessed, via interview, most domains covered at enrollment.

Randomization and intervention

Subjects were randomized to the control or intervention group. Control subjects received usual care (i.e., they were told their screening results and advised they could discuss their alcohol use with their physicians). Intervention subjects were assigned to 30 minutes of brief motivational counseling that was based on the principles of motivational interviewing (Miller and Rollnick, 1991, 2002; Miller et al., 1995a). Sessions were conducted by counseling and clinical psychology doctoral students whom we trained and included feedback, an open discussion (lasting about 20 minutes), and construction of a change plan (Saitz et al., 2007).

Outcomes and measurements

The primary outcomes in this study were self-reported receipt of alcohol treatment in the past 3 months among subjects with alcohol dependence and change in the mean number of drinks per day from enrollment to 3 and 12 months in subjects with and without dependence. We measured receipt of treatment with a standardized interview based on the Treatment Services Review (McLellan et al., 1992a) and Form 90 (Miller, 1996). Treatment included residential treatment, outpatient treatment (e.g., counseling or therapy), medications, employee-assistance programs, or mutual-help groups (e.g., Alcoholics Anonymous). We measured past-30-day consumption with the Timeline Followback method (Sobell and Sobell, 1992). From this, we determined mean drinks per day, days abstinent, and heavy drinking episodes (≥ 5 drinks per occasion for men and ≥ 4 for women and people age ≥ 66 years). We also assessed the proportions of subjects who abstained for all 30 days, had at least one heavy drinking episode, and drank risky amounts (>14 drinks per week or ≥ 5 drinks per occasion for men; >7 drinks per week or ≥ 4 drinks per occasion for women and people age ≥ 66 years). Additional secondary outcomes included alcohol problems (total score on the Short Inventory of Problems; Miller et al., 1995b), readiness to change (Taking Steps scale of the Stages of Change Readiness and Treatment Eagerness Scale [SOCRATES]; Miller and Tonigan, 1996), physical and mental health-related quality of life (physical and mental component summary scale scores on the Short-Form Health Survey [SF-12]; Ware et al., 1998), and emergency-department visits and days of medical hospitalization (both determined by a standardized interview based on the Treatment Services Review and Form 90; McLellan et al., 1992a; Miller, 1996).

TABLE 1. Characteristics at enrollment of subjects with unhealthy alcohol use, by dependence status and randomized group ($n = 341$)

Variable	Subjects with nondependent, unhealthy alcohol use		Subjects with dependent, unhealthy alcohol use	
	Control ($n = 40$)	Interv. ($n = 40$)	Control ($n = 129$)	Interv. ($n = 132$)
Demographics				
Women, no. (%)	14 (35%)	9 (23%)	45 (35%)	31 (23%)
Age, mean (SD)	45 (13)	46 (13)	44 (10)	44 (10)
Race/ethnicity				
Black, no. (%)	16 (40%)	15 (38%)	64 (50%)	60 (45%)
White, no. (%)	20 (50%)	18 (45%)	46 (36%)	49 (37%)
Hispanic, no. (%)	2 (5%)	4 (10%)	11 (9%)	13 (10%)
Unemployed, past 3 months, no. (%)	21 (53%)	21 (53%)	83 (64%)	91 (69%)
Homeless, ≥ 1 night, past 3 months, no. (%)	5 (13%)	3 (8%)	34 (26%)	44 (33%)
Medical diagnoses				
Principal diagnosis, most common at current admission ^a				
Rule out myocardial infarction, no. (%)	4 (10%)	9 (23%)	26 (20%)	22 (17%)
Asthma, bronchitis, and COPD, no. (%)	11 (28%)	3 (8%)	10 (8%)	12 (9%)
Pancreatitis, no. (%)	0 (0%)	1 (3%)	13 (10%)	19 (14%)
Cellulitis, no. (%)	5 (13%)	2 (5%)	9 (7%)	6 (5%)
Diabetes, no. (%)	0 (0%)	4 (10%)	5 (4%)	5 (4%)
Alcohol-attributable diagnosis, ^b no. (%)	3 (8%)	3 (8%)	17 (13%)	28 (21%)
Any alcohol-attributable diagnosis, ^b current admission, no. (%)	9 (23%)	10 (25%)	57 (44%)	80 (61%)
Comorbidity ^c lifetime, median score (Q1-Q3)	1 (0-1)	1 (0-2)	1 (0-2)	1 (0-2)
DSM-IV Alcohol Diagnoses,^a past year				
Alcohol abuse, no. (%)	8 (20%)	7 (18%)	—	—
Alcohol dependence, no. (%)	—	—	129 (100%)	132 (100%)
No alcohol diagnosis, no. (%)	32 (80%)	33 (83%)	—	—
Alcohol consumption,^a past 30 days				
Drinks/day, median (Q1-Q3)	1.5 (0.8-2)	1.4 (0.7-2)	5 (2-12)	5 (2-10)
Drinks/drinking day, median (Q1-Q3)	6 (4-10)	5 (3-6)	9 (6-16)	12 (7-16)
Maximum no. of drinks/occasion, median (Q1-Q3)	10 (6-13)	8 (6-12)	17 (12-24)	18 (12-24)
Alcohol-related characteristics				
Readiness to change, taking steps, ^a median score (Q1-Q3)	24 (16-30)	24 (16-28)	31 (26-34)	31 (27-35)
Family history of alcoholism, ^d no. (%)	31 (82%)	29 (73%)	105 (83%)	119 (93%)
Alcohol problems, ^a past 3 months, median score (Q1-Q3)	1 (0-3)	1 (0-4)	16 (9-27)	21 (9-34)
Drug use, past 30 days				
Cigarettes, ^e no. (%)	24 (60%)	26 (65%)	105 (81%)	102 (77%)
Heroin/cocaine use, ^f no. (%)	8 (20%)	4 (10%)	43 (33%)	33 (25%)
Any drug use, ^g no. (%)	20 (50%)	14 (35%)	86 (67%)	75 (57%)
Psychiatric/violence history				
Panic disorder, ^h (current), no. (%)	1 (3%)	0 (0%)	24 (19%)	31 (23%)
Generalized anxiety disorder, ^h current, no. (%)	17 (43%)	17 (43%)	109 (85%)	104 (79%)
Substantial depressive symptoms, ⁱ current, no. (%)	20 (50%)	12 (30%)	101 (79%)	110 (83%)
Substantial PTSD symptoms, ^j current, no. (%)	7 (18%)	3 (8%)	54 (42%)	75 (57%)
Victim of interpersonal violence (e.g., physical, sexual), ^k lifetime, no. (%)	22 (55%)	19 (48%)	102 (79%)	96 (73%)
Health-related quality of life (HRQL)^a				
Physical HRQL, mean score (SD)	38 (10)	40 (10)	38 (9)	38 (9)
Mental HRQL, mean score (SD)	46 (12)	51 (10)	38 (11)	37 (13)
Health care use, past 3 months				
Alcohol treatment, ^a no. (%)	1 (3%)	0 (0%)	33 (26%)	52 (40%)
Expanded alcohol treatment, ^l no. (%)	3 (8%)	0 (0%)	42 (33%)	60 (46%)
Any psychiatric treatment, no. (%)	5 (13%)	2 (5%)	34 (26%)	42 (32%)
Psychiatric hospitalization, no. (%)	0 (0%)	0 (0%)	6 (5%)	6 (5%)
Medical hospitalization, no. (%)	10 (25%)	4 (10%)	39 (30%)	45 (34%)
Days hospitalized, median, Q1-Q3	0 (0-5)	0 (0-0)	0 (0-2)	0 (0-2)
Emergency-department use, no. (%)	14 (35%)	9 (23%)	65 (50%)	67 (51%)
Emergency-department visits, median (Q1-Q3)	0 (0-1)	0 (0-0)	1 (0-2)	1 (0-2)

Notes: Interv. = intervention; COPD = chronic obstructive pulmonary disease; Q1 = quartile 1 (or 25th percentile); Q3 = quartile 3 (or 75th percentile); DSM-IV, Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition; PTSD = posttraumatic stress disorder. ^aSee the Method section for a description of how this characteristic was measured; ^bincludes any of the following: acute alcoholic cirrhosis of the liver, alcoholic cardiomyopathy, alcoholic gastritis, alcoholic hepatitis, alcohol intoxication, alcoholic liver damage, alcoholic fatty liver, alcoholic pellagra, alcoholic polyneuropathy, alcohol withdrawal, alcohol withdrawal

TABLE 1 Notes Continued on following page

Statistical analyses

We conducted all analyses based on the intention-to-treat principle. Reported p values are two-tailed, and a p value less than .05 was considered statistically significant. We analyzed data with SAS/STAT software Versions 8.2 and 9.1.3 (SAS Institute Inc., Cary, NC). To describe the study sample and compare groups, we used the chi-square test, Fisher's exact test, two-sample t test, and Wilcoxon rank sum test, as appropriate. We analyzed dichotomous outcomes using the chi-square test and logistic regression models, continuous outcomes using the two-sample t test and linear regression models, and counts (i.e., drinking and health care use) using Poisson models that accounted for overdispersion. We planned, a priori, to assess possible moderators of the intervention, including demographic factors (gender, race, age [<44 and ≥ 44 years], homelessness [≥ 1 night in the past 3 months]), comorbidity/health (mental health-related quality of life [<45 and ≥ 45 on the mental component summary scale of the SF-12], any alcohol-attributable medical diagnosis at current admission, any past-30-day heroin or cocaine use), and readiness to change (<30 or ≥ 30 on the SOCRATES Taking Steps scale). Post hoc, we decided to include cognitive functioning (<27 and ≥ 27 on the Mini-Mental State Examination) among the comorbidity/health factors. Within dependence strata, we tested for these possible moderators. When moderators were significant, we reported stratified analyses. Regression analyses stratified only by dependence controlled for clinically important baseline imbalances between the treatment arms; analyses with further stratifications adjusted for the baseline value of the outcome only.

Results

Screening and enrollment data have been described elsewhere (Saitz et al., 2006, 2007). In summary, 341 patients of 986 who screened positive for drinking risky amounts enrolled in the randomized trial (Figure 1). Of enrolled subjects, 172 were randomized to the intervention group and 169 to the control group. Over 12 months, 11 subjects died; 90% (308) of all enrolled subjects completed at least one follow-up interview. Subjects who completed any follow-up were generally similar to those lost to follow-up.

Subjects with nondependent, unhealthy alcohol use in the control group were similar to those in the intervention group with the exception of mental health-related quality of life, which was significantly higher in the intervention group (Table 1). Among subjects with dependence, those in the control group were significantly more likely than those in the intervention group to be women; controls were less likely to have received alcohol treatment, detoxification, or halfway house services in the past 3 months and to have any alcohol-attributable diagnosis, a family history of alcoholism, and substantial depressive symptoms.

Alcohol treatment (subjects with dependence only)

In the main study findings previously reported by Saitz et al. (2007), brief intervention was associated with receipt of alcohol treatment, but the association was not significant and it was attenuated in adjusted analyses (Table 2). In analyses adjusted for potential confounders and simultaneously for interactions that were significant ($p \leq .10$) in unadjusted analyses, interactions between the intervention and gender and age remained significant (both $p = .02$). In subsequent stratified analyses, brief intervention was associated with increased receipt of alcohol treatment by women and younger men (<44 years) in unadjusted models (Table 2). In adjusted analyses, the results remained statistically significant for women but not for younger men. Of note, older men with dependence were significantly more likely than younger men with dependence to be white (46% vs 30%), live alone (47% vs 27%), be unemployed (69% vs 53%), and have worse physical health-related quality of life (mean SF-12 physical component summary score, 36 vs 40) but were significantly less likely to have substantial symptoms of posttraumatic stress disorder (39% vs 58%).

Because women, regardless of age, appeared to benefit most from the brief intervention, we explored other possible gender effects. We detected an interaction between the intervention and alcohol-attributable medical diagnosis among women ($p = .006$) but not men. Of women with any alcohol-attributable medical diagnosis, those in the intervention group were more likely than those in the control group to receive treatment (Table 2). Among women with higher cognitive function, receipt of treatment was more likely among subjects in the intervention group than in the control

TABLE 1 Notes Continued

convulsion, alcohol withdrawal delirium, alcohol withdrawal hallucinosis, other alcoholic psychosis, alcoholic amnestic syndrome, other alcoholic dementia, alcoholic pancreatitis, or other diagnoses thought to be alcohol-attributable by the investigator (e.g., holiday heart, alcoholic ketoacidosis, alcohol-related rhabdomyolysis) (Adams et al., 1993); ^cdetermined by a validated questionnaire (Katz et al., 1996); ^ddetermined by the Family History-Research Diagnostic Criteria (Andreasen et al., 1977); $n = 38$ for controls with nondependent, unhealthy alcohol use; ^ebased on a response of "yes, every day in the past 30 days" to the question: "Do you currently smoke?" (Patrick et al., 1994); ^fdetermined by the Addiction Severity Index (McLellan et al., 1992b); ^gdetermined by the Addiction Severity Index and includes use of heroin, methadone, other opiates/analgesics, barbiturates, sedatives/hypnotics/tranquilizers, cocaine, amphetamines, marijuana/cannabis, or hallucinogens; ^hdetermined by the Primary Care Evaluation of Mental Disorders Patient Health Questionnaire (Spitzer et al., 1994); ⁱ ≥ 16 on the Center for Epidemiologic Studies Depression scale (Boyd et al., 1982; Radloff, 1977); ^j ≥ 44 on the Post Traumatic Stress Disorder Checklist (Blanchard et al., 1996); ^kdetermined by adapted items from the Traumatic Life Events Questionnaire-Revised (Kubany et al., 2000); ^lincludes alcohol treatment, except for medications, plus hospitalization for detoxification (any type); participation in any detoxification program; or halfway house services.

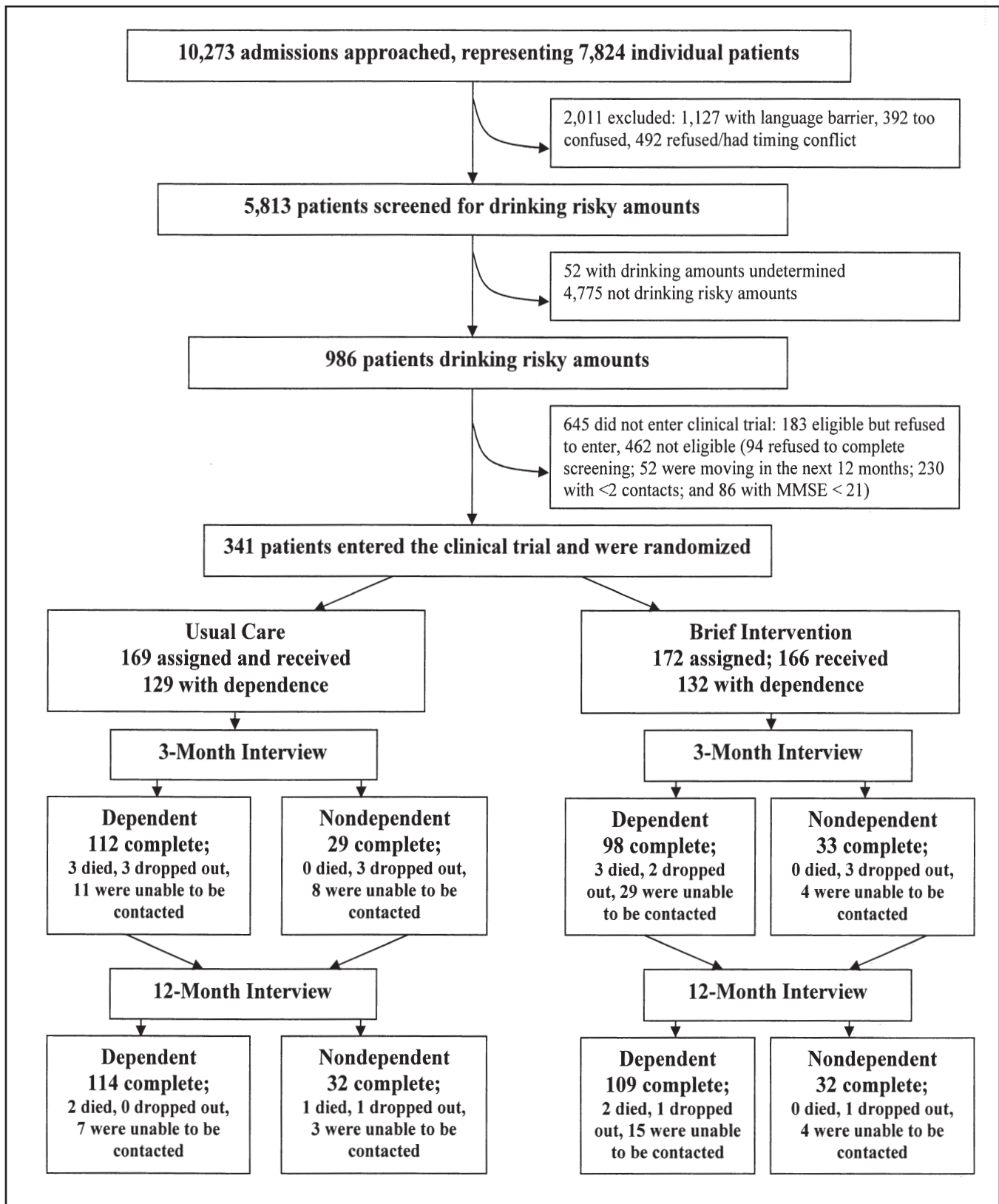


FIGURE 1. Screening and enrollment. Dependence/dependent refers to a diagnosis of alcohol dependence. MMSE = Mini-Mental State Examination. Subjects who dropped out at 3 months were permanently lost to follow-up. Subjects who could not be contacted at 3 months may have been contacted at 12 months. Analyses for treatment at 3 months included only subjects with dependence. All other analyses included all randomized subjects with available data.

TABLE 2. Alcohol treatment by 3 months in subjects with alcohol dependence

Variable	Numbers and proportions		OR (95% CI) Intervention vs control	Adjusted ORs (95% CI) Intervention vs control
	Control	Intervention		
Overall ($n = 209$) ^a	44/112 (39%)	50/97 (52%)	1.6 (0.9-2.8)	1.2 (0.6-2.5) ^d
Stratified by gender (interaction $p = .02$) [*]				
Men ($n = 145$)	29/71 (41%)	34/74 (46%)	1.2 (0.6-2.4)	0.71 (0.32-1.6)
Women ($n = 64$)	15/41 (37%)	16/23 (70%)	4.0 (1.3-11.8)	3.9 (1.2-12.7)
Stratified by age (interaction $p = .02$) [*]				
Age < 44 ($n = 93$)	18/51 (35%)	27/42 (64%)	3.3 (1.4-7.7)	3.6 (1.3-10.1)
Age ≥ 44 ($n = 116$)	26/61 (43%)	23/55 (42%)	1.0 (0.5-2.0)	0.56 (0.23-1.4)
Stratified by gender and age (interaction $p = .02$ for men, $p = .86$ for women)				
Men age < 44 ($n = 58$)	9/27 (33%)	19/31 (61%)	3.2 (1.1-9.3)	3.0 (0.74-12.2)
Men age ≥ 44 ($n = 87$)	20/44 (45%)	15/43 (35%)	0.6 (0.3-1.5)	0.26 (0.08-0.86)
Women age < 44 ($n = 35$)	9/24 (38%)	8/11 (73%)	4.4 (0.9-21.2)	4.7 (0.84-26.7)
Women age ≥ 44 ($n = 29$)	6/17 (35%)	8/12 (67%)	3.7 (0.8-17.4)	3.2 (0.60-17.1)
Stratified by gender and alcohol-attributable medical diagnosis ^c (interaction $p = .97$ for men, $p = .006$ for women)				
Men with a diagnosis ($n = 82$)	16/33 (48%)	25/49 (51%)	1.1 (0.5-2.7)	0.70 (0.25-2.0)
Men without a diagnosis ($n = 63$)	13/38 (34%)	9/25 (36%)	1.1 (0.4-3.1)	0.48 (0.12-2.0)
Women with a diagnosis ($n = 29$)	4/15 (27%)	13/14 (93%)	35.7 (3.5-368.8)	63.5 (3.7-1083.5)
Women without a diagnosis ($n = 35$)	11/26 (42%)	3/9 (33%)	0.7 (0.1-3.3)	0.55 (0.09-3.2)
Stratified by gender and cognitive functioning (interaction $p = .87$ for men, $p = .21$ for women)				
Men with high cognitive functioning ^b ($n = 76$)	16/40 (40%)	18/36 (50%)	1.5 (0.6-3.7)	1.1 (0.40-3.1)
Men with low cognitive functioning ($n = 69$)	13/31 (42%)	16/38 (42%)	1.0 (0.4-2.6)	0.35 (0.08-1.4)
Women with high cognitive functioning ($n = 32$)	6/21 (29%)	8/11 (73%)	6.7 (1.3-34.0)	7.8 (1.3-46.3)
Women with low cognitive functioning ($n = 32$)	9/20 (45%)	8/12 (67%)	2.4 (0.6-10.8)	1.9 (0.36-10.1)

Notes: OR = odds ratio; CI = confidence interval. ^{*} p value from analysis adjusting simultaneously for interactions between the intervention and age, gender, cognitive functioning, and alcohol-attributable medical diagnosis (interactions identified in initial unadjusted analyses). ^a210 subjects with alcohol dependence were interviewed at 3 months; however, 1 did not answer questions about alcohol treatment; ^bhigh cognitive functioning is ≥ 27 on the Mini-Mental State Examination; ^cincludes any of the following: acute alcoholic cirrhosis of the liver, alcoholic cardiomyopathy, alcoholic gastritis, alcoholic hepatitis, alcohol intoxication, alcoholic liver damage, alcoholic fatty liver, alcoholic pellagra, alcoholic polyneuropathy, alcohol withdrawal, alcohol withdrawal convulsion, alcohol withdrawal delirium, alcohol withdrawal hallucinosis, other alcoholic psychosis, alcoholic amnesic syndrome, other alcoholic dementia, alcoholic pancreatitis, or other diagnoses thought to be alcohol-attributable by the investigator (e.g., holiday heart, alcoholic ketoacidosis, alcohol-related rhabdomyolysis) (Adams et al., 1993); ^doverall analysis adjusted for gender, alcohol treatment in the 3 months before enrollment, family history of alcoholism, any drug use, alcohol problem score, and alcohol-attributable medical diagnoses; remainder of adjusted odds ratios in the table adjusted for alcohol treatment in the 3 months before enrollment only.

group. We found no significant interactions between the intervention and race, mental health-related quality of life, homelessness, heroin or cocaine use, or readiness to change among women or men. Findings of the analyses adjusted for prior alcohol treatment were similar (Table 2).

Alcohol consumption

At 3 and 12 months in both adjusted and unadjusted analyses, across the six outcome measures (Table 3) for

those with and without dependence, only one comparison was significant: In adjusted analyses, among subjects with nondependent, unhealthy alcohol use at 3 months, the intervention group drank less than controls (adjusted means 1.5 vs 3.8 drinks per day, incidence rate ratio [IRR] = 0.38, $p = .02$). At 12 months among subjects with nondependent, unhealthy alcohol use, 19% were abstinent, 67% had at least one heavy drinking episode, and 67% were drinking risky amounts. For subjects with dependence, the proportions were 31%, 61%, and 61%, respectively.

TABLE 3. Alcohol-consumption outcomes at 3 and 12 months in subjects with unhealthy alcohol use

Consumption measures	3 months ^a						12 months ^f					
	Without dependence			With dependence			Without dependence			With dependence		
	Control	Interv.	<i>p</i>	Control	Interv.	<i>p</i>	Control	Interv.	<i>p</i>	Control	Interv.	<i>p</i>
Past 30 days, mean												
No. drinks per day	3.63	1.72	.16	5.33	5.26	.95	2.28	2.10	.81	4.97	5.72	.49
No. drinks per day, adj. ^b	3.84	1.46	.02*	3.97	4.12	.87	2.04	1.35	.22	3.29	4.14	.25
No. heavy drinking episodes ^c	6.66	5.18	.47	10.07	10.30	.88	6.00	5.63	.85	10.25	10.34	.95
No. heavy drinking episodes, adj.	4.91	4.06	.52	7.68	9.24	.21	4.75	4.39	.81	7.30	8.13	.47
No. days abstinent	19.00	19.91	.72	16.91	17.40	.76	19.72	19.75	.99	17.47	17.19	.86
No. days abstinent, adj.	19.24	20.15	.69	17.35	15.57	.27	19.87	19.78	.97	18.40	16.45	.24
Past 30 days, with the control group as the reference, OR (95% CI)												
Drinking risky amounts ^d	0.9 (0.3-2.6)			0.9 (0.5-1.5)			0.9 (0.3-2.5)			0.9 (0.5-1.6)		
Drinking risky amounts, adj. ^e	0.9 (0.2-3.6)			1.1 (0.6-2.1)			1.1 (0.3-3.7)			1.2 (0.6-2.1)		
Heavy drinking episodes	0.8 (0.3-2.3)			0.8 (0.5-1.5)			0.9 (0.3-2.5)			1.0 (0.6-1.7)		
Heavy drinking episodes, adj.	0.7 (0.2-2.7)			1.0 (0.5-1.9)			1.1 (0.3-3.7)			1.2 (0.7-2.2)		
Abstinence	1.1 (0.3-3.9)			1.1 (0.6-2.2)			1.0 (0.3-3.5)			1.2 (0.7-2.0)		
Abstinence, adj.	0.7 (0.1-3.6)			0.9 (0.4-1.8)			0.8 (0.2-3.3)			1.0 (0.5-1.8)		

Notes: Interv. = intervention; adj. = adjusted; OR = odds ratio; CI = confidence interval. *Incidence rate ratio (for intervention effect) = 0.38. ^aAt 3 months among subjects without dependence, 62 were included in the unadjusted analyses, and 60 were included in the adjusted analyses; at 3 months among subjects with dependence, 209 were included in the unadjusted analyses and 204 were included in the adjusted analyses; ^badjusted for gender, alcohol treatment in the 3 months before enrollment, family history of alcoholism, any drug use, alcohol problem score, and alcohol-attributable medical diagnoses; ^c≥5 drinks per occasion for men or ≥4 drinks per occasion for women and people age ≥ 66 years; ^d>14 standard drinks per week or ≥5 drinks per occasion for men; >7 drinks per week or ≥4 drinks per occasion for women and people age ≥ 66 years; ^eadjusted for mean drinks per day at enrollment, gender, alcohol treatment in the 3 months before enrollment, family history of alcoholism, any drug use, alcohol problem score, and alcohol-attributable medical diagnoses; ^fat 12 months among subjects without dependence, 64 were included in the unadjusted analyses, and 63 were included in the adjusted analyses; at 12 months among subjects with dependence, 223 were included in the unadjusted analyses, and 217 were included in the adjusted analyses.

To identify possible reasons why we failed to find the hypothesized intervention effects on consumption outcomes, we examined 12-month data and found no significant interactions between the intervention and possible moderators (demographics, comorbidity/health, or readiness to change) on abstinent days or heavy episodic drinking. For drinks per day, we identified only two interactions, age ($p = .01$) and heroin or cocaine use ($p = .03$), among subjects with nondependent, unhealthy alcohol use. Among younger (<44 years) but not older subjects with nondependent, unhealthy alcohol use, the intervention decreased drinks per day (adjusted mean drinks 0.6 vs 2.7, IRR = 0.24, $p = .004$). In stratified analyses, intervention effects appeared larger among drug users compared with nonusers (adjusted mean drinks 0.8 vs 4.9, IRR = 0.17 for drug users [$p = .17$]; and adjusted mean drinks 1.6 vs 1.9, IRR = 0.85 for nonusers [$p = .64$]). However, effects were not significant in either subgroup. The intervention effect appeared to be stronger for those who used heroin or cocaine.

Readiness to change, quality of life, health care use, and alcohol problems

At 3 months among subjects with nondependent, unhealthy alcohol use, intervention subjects had better physical health-related quality of life (adjusted mean SF-12 physical component summary scores 43 vs 38, adjusted mean difference 5, $p = .03$), but among subjects with dependence, intervention was associated with worse physical health-related

quality of life (adjusted physical component summary scores 36 vs 40, adjusted mean difference -4, $p = .02$). Physical component summary scores did not differ by intervention group at 12 months. Aside from an improvement in mental health-related quality of life in unadjusted analyses among nondependent intervention subjects at 12 months (mean SF-12 mental component summary scores 51 vs 43, unadjusted mean difference 8, $p = .02$), mental component summary scores did not differ by intervention group in unadjusted or adjusted analyses at 3 or 12 months. In adjusted and unadjusted analyses stratified by the presence or absence of dependence, intervention was not significantly associated with alcohol problems or readiness to change. Aside from a greater number of days hospitalized in adjusted analyses (12.3 vs 5.0 days, IRR = 2.47, $p = .01$) and greater emergency-department visits in unadjusted analyses (1.5 vs 1.0 visits, IRR = 1.55, $p = .03$) at 3 months, health care use among dependent intervention subjects did not differ by intervention group in unadjusted or adjusted analyses at 3 or 12 months.

Discussion

We assessed brief intervention effects and the possible moderating effects of various demographic and health characteristics among patients with the spectrum of unhealthy alcohol use who were identified by screening on a hospital medicine service. As such, our study is unique. In this study,

the brief motivational intervention had both hypothesized and unanticipated effects. The intervention increased receipt of treatment in women and may be beneficial in younger men but not older men with alcohol dependence. An alcohol-attributable medical diagnosis and higher cognitive functioning moderated the effects of the intervention in women; these women in the intervention group were more likely than those in the control group to receive treatment. Of note, poorer mental health, homelessness, other drug use, and readiness to change did not impact the effects of brief intervention on receipt of treatment.

Contrary to our hypothesis, brief intervention had little effect on alcohol consumption. Both intervention and control groups had lower consumption at follow-up than at study entry. Factors other than, or in addition to, the brief intervention may have played a role in decreasing consumption, including subjects' medical illnesses, hospitalization and related services, natural history, regression to the mean, and a detailed research assessment of alcohol use that may have motivated change. Among subjects with nondependent, unhealthy alcohol use, one adjusted comparison was significant—brief intervention was associated with less consumption (drinks/day) at 3 months. In subgroup analyses, the effect of brief intervention on consumption was limited to younger people, and appeared to be larger among those who used drugs (an unexpected finding). Homelessness, mental health-related quality of life, cognitive impairment, and readiness to change did not appear to moderate the effects of brief intervention on drinking. However, the sample sizes of the subgroups were small and thus were likely underpowered to detect interactions.

Brief intervention may also have led to improved physical and perhaps mental health-related quality of life among those with nondependent, unhealthy alcohol use. But we also found unexpected possible detrimental effects of brief intervention among dependent subjects on physical health-related quality of life and hospital and emergency-department use. Although unexpected, these potential adverse effects of brief intervention should not be ignored in future studies because we should not expect all brief intervention effects to be favorable. Intervention did not significantly affect the other nonconsumption outcomes we assessed.

Studies of the efficacy of brief intervention for unhealthy alcohol use in hospitalized patients have produced mixed results. In a systematic review of controlled studies of inpatients on hospital services, brief intervention was associated with decreased alcohol-related problems but not changes in consumption (Emmen et al., 2004). Among studies specific to medical inpatients, results are also conflicting—some support brief intervention, and others do not (Chick et al., 1985; Freyer-Adam et al., 2008; Kuchipudi et al., 1990; Saitz et al., 2007). Studies of inpatients who are hospitalized on nonmedical services (e.g., trauma, orthopedic surgery),

however, have more consistently demonstrated the efficacy of brief intervention for decreasing alcohol consumption (Antti-Poika et al., 1988; Blondell et al., 2001; Elvy et al., 1988; Gentilello et al., 1999) and increasing alcohol-treatment entry and mutual-help group use (Antti-Poika et al., 1988; Blondell et al., 2001; Dunn and Ries, 1997; Elvy et al., 1988).

Several limitations should be considered when interpreting these results. First, this is a secondary data analysis assessing multiple associations; the results should be viewed only as exploratory and hypothesis-generating rather than confirmatory (Lagakos, 2006). Second, the sample size precluded adjustment for all confounding factors in subgroup analyses and also limited the detection of both moderators and intervention effects in subgroups, particularly in women and subjects without dependence. Despite these limitations, this study suggests that although universal screening and brief intervention on a medicine service may not be effective across a wide spectrum of patients, certain groups may benefit from such efforts. Brief intervention shows promise for (1) increasing receipt of treatment among alcohol-dependent women (particularly those with higher cognitive functioning or an alcohol-attributable diagnosis) and younger men, and (2) decreasing consumption among those with nondependent, unhealthy alcohol use. But in this setting, brief intervention's effects on a wide range of clinically important outcomes were not robust (regardless of dependence status). Still, there is some reason for optimism given that factors hypothesized to impede the success of brief intervention (e.g., poorer mental health, drug use, homelessness) do not appear to be responsible for the lack of overall effects on consumption.

The evidence from controlled trials in primary care settings is clear: Brief intervention for patients with nondependent, unhealthy alcohol use identified by screening has modest efficacy for decreasing consumption. Evidence from studies in other populations, however, remains conflicting. Regardless, screening and brief intervention programs for unhealthy alcohol and other drug use are being disseminated worldwide (e.g., by large federal efforts in the United States and by the World Health Organization) in diverse medical settings in which patients may differ greatly in circumstance and severity from those deemed most likely, according to the best evidence, to benefit from brief intervention. As such, attention should return to issues of efficacy as well as to effectiveness. Further, it should be clear that the targets of screening and brief intervention—unhealthy alcohol and other drug use—are not monolithic and amenable to single, simple solutions. Therefore, research should begin to address when, for whom, and under what circumstances these procedures are and are not effective (O'Connor, 2007), and clinical implementation efforts should consider these complexities as dissemination of screening and brief intervention programs proceeds.

Acknowledgment

We are grateful for the data management efforts of Alison Pedley at DM-STAT, Malden, MA.

References

- ADAMS, W.L., YUAN, Z., BARBORIAK, J.J., AND RIMM, A.A. Alcohol-related hospitalizations of elderly people: Prevalence and geographic variation in the United States. *JAMA* **270**: 1222-1225, 1993.
- ANDREASEN, N.C., ENDICOTT, J., SPITZER, R.L., AND WINOKUR, G. The family history method using diagnostic criteria: Reliability and validity. *Arch. Gen. Psychiat.* **34**: 1229-1235, 1977.
- ANTTI-POIKA, I., KARAHARJU, E., ROINE, R., AND SALASPURO, M. Intervention of heavy drinking: A prospective and controlled study of 438 consecutive injured male patients. *Alcohol Alcm* **23**: 115-121, 1988.
- BATES, M.E., PAWLAK, A.P., TONIGAN, J.S., AND BUCKMAN, J.F. Cognitive impairment influences drinking outcome by altering therapeutic mechanisms of change. *Psychol. Addict. Behav.* **20**: 241-253, 2006.
- BLANCHARD, E.B., JONES-ALEXANDER, J., BUCKLEY, T.C., AND FORNERIS, C.A. Psychometric properties of the PTSD Checklist (PCL). *Behav. Res. Ther.* **34**: 669-673, 1996.
- BLONDELL, R.D., LOONEY, S.W., NORTHINGTON, A.P., LASCH, M.E., RHODES, S.B., AND MCDANIELS, R.L. Can recovering alcoholics help hospitalized patients with alcohol problems? *J. Fam. Pract.* **50**: 447, 2001.
- BLOW, F.C., BARRY, K.L., WALTON, M.A., MAIO, R.F., CHERMACK, S.T., BINGHAM, C.R., IGNACIO, R.V., AND STRECHER, V.J. The efficacy of two brief intervention strategies among injured, at-risk drinkers in the emergency department: Impact of tailored messaging and brief advice. *J. Stud. Alcohol* **67**: 568-578, 2006.
- BOYD, J.H., WEISSMAN, M.M., THOMPSON, W.D., AND MYERS, J.K. Screening for depression in a community sample: Understanding the discrepancies between depression symptom and diagnostic scales. *Arch. Gen. Psychiat.* **39**: 1195-1200, 1982.
- CENTER FOR SUBSTANCE ABUSE TREATMENT. Screening, Brief Intervention, and Referral to Treatment, Rockville, MD: Substance Abuse and Mental Health Services Administration (available at: <http://sbirt.samhsa.gov/>) accessed 7/9/2007.
- CHICK, J., LLOYD, G., AND CROMBIE, E. Counselling problem drinkers in medical wards: A controlled study. *Brit. Med. J. Clin. Res. Ed.* **290**: 965-967, 1985.
- DUNN, C.W. AND RIES, R. Linking substance abuse services with general medical care: Integrated, brief interventions with hospitalized patients. *Amer. J. Drug Alcohol Abuse* **23**: 1-13, 1997.
- ELVY, G.A., WELLS, J.E., AND BAIRD, K.A. Attempted referral as intervention for problem drinking in the general hospital. *Brit. J. Addict.* **83**: 83-89, 1988.
- EMMEN, M.J., SCHIPPERS, G.M., BLEIJENBERG, G., AND WOLLERSHEIM, H. Effectiveness of opportunistic brief interventions for problem drinking in a general hospital setting: Systematic review. *BMJ* **328**: 318, 2004.
- FOLSTEIN, M.F., FOLSTEIN, S.E., AND MCHUGH, P.R. Mini-mental state: A practical method for grading the cognitive state of patients for the clinician. *J. Psychiat. Res.* **12**: 189-198, 1975.
- FREYER-ADAM, J., CODER, B., BAUMEISTER, S.E., BISCHOF, G., RIEDEL, J., PAATSCH, K., WEDLER, B., RUMPF, H.-J., JOHN, U., AND HAPKE, U. Brief alcohol intervention for general hospital inpatients: A randomized controlled trial. *Drug Alcohol Depend.* **93**: 233-243, 2008.
- GENTILELLO, L.M., RIVARA, F.P., DONOVAN, D.M., JURKOVICH, G.J., DARANGCIANG, E., DUNN, C.W., VILLAVECES, A., COPASS, M., AND RIES, R.R. Alcohol interventions in a trauma center as a means of reducing the risk of injury recurrence. *Ann. Surg.* **230**: 473-483, 1999.
- GUTH, S., LINDBERG, S.A., BADGER, G.J., THOMAS, C.S., ROSE, G.L., AND HELZER, J.E. Brief intervention in alcohol-dependent versus nondependent individuals. *J. Stud. Alcohol Drugs* **69**: 243-250, 2008.
- HEATHER, N., ROLLNICK, S., BELL, A., AND RICHMOND, R. Effects of brief counselling among male heavy drinkers identified on general hospital wards. *Drug Alcohol Rev.* **15**: 29-38, 1996.
- INSTITUTE OF MEDICINE. Broadening the Base of Treatment for Alcohol Problems, Washington, DC: National Academies Press, 1990.
- KATZ, J.N., CHANG, L.C., SANGHA, O., FOSSEL, A.H., AND BATES, D.W. Can comorbidity be measured by questionnaire rather than medical record review? *Med. Care* **34**: 73-84, 1996.
- KUBANY, E.S., HAYNES, S.N., LEISEN, M.B., OWENS, J.A., KAPLAN, A.S., WATSON, S.B., AND BURNS, K. Development and preliminary validation of a brief broad-spectrum measure of trauma exposure: The Traumatic Life Events Questionnaire. *Psychol. Assess.* **12**: 210-224, 2000.
- KUCHIPUDI, V., HOBEIN, K., FLICKINGER, A., AND IBER, F.L. Failure of a 2-hour motivational intervention to alter recurrent drinking behavior in alcoholics with gastrointestinal disease. *J. Stud. Alcohol* **51**: 356-360, 1990.
- LAGAKOS, S.W. The challenge of subgroup analyses—reporting without distorting. *New Eng. J. Med.* **354**: 1667-1669, 2006.
- MCLELLAN, A.T., ALTERMAN, A.I., CACCIOLA, J., METZGER, D., AND O'BRIEN, C.P. A new measure of substance abuse treatment: Initial studies of the treatment services review. *J. Nerv. Ment. Dis.* **180**: 101-110, 1992a.
- MCLELLAN, A.T., KUSHNER, H., METZGER, D., PETERS, R., SMITH, I., GRISSOM, G., PETTINATI, H., AND ARGERIOU, M. The Fifth Edition of the Addiction Severity Index. *J. Subst. Abuse Treat.* **9**: 199-213, 1992b.
- MCMANUS, S., HIPKINS, J., HADDAD, P., GUTHRIE, E., AND CREED, F. Implementing an effective intervention for problem drinkers on medical wards. *Gen. Hosp. Psychiat.* **25**: 332-337, 2003.
- MILLER, W.R. Form 90: A Structured Assessment Interview for Drinking and Related Behaviors: Test Manual. NIAAA Project Match Monograph Series, Vol. 5, NIH Publication No. 96-4004, Bethesda, MD: National Institute on Alcohol Abuse and Alcoholism, 1996.
- MILLER, W.R. AND ROLLNICK, S. Motivational Interviewing: Preparing People to Change Addictive Behavior, New York: Guilford Press, 1991.
- MILLER, W.R. AND ROLLNICK, S. Motivational Interviewing: Preparing People for Change, 2nd Edition, New York: Guilford Press, 2002.
- MILLER, W.R. AND TONIGAN, J.S. Assessing drinkers' motivation for change: The Stages of Change Readiness and Treatment Eagerness Scale (SOCRATES). *Psychol. Addict. Behav.* **10**: 81-89, 1996.
- MILLER, W.R., TONIGAN, J.S., AND LONGABAUGH, R. The Drinker Inventory of Consequences (DrInC): An Instrument for Assessing Adverse Consequences of Alcohol Abuse: Test Manual. NIAAA Project MATCH Monograph Series, Vol. 4, NIH Publication No. 95-3911, Bethesda, MD: National Institute on Alcohol Abuse and Alcoholism, 1995b.
- MILLER, W.R., ZWEBER, A., DICLEMENTE, C.C., AND RYCHTARIK, R.G. Motivational Enhancement Therapy Manual: A Clinical Research Guide for Therapists Treating Individuals with Alcohol Abuse and Dependence. NIAAA Project MATCH Monograph Series, Vol. 2, DHHS Publication No. (ADM) 92-1894, Washington: Government Printing Office, 1995a.
- O'CONNOR, P. Brief interventions for problem drinking: Another piece of the puzzle (editorial). *Ann. Intern. Med.* **146**: 223-225, 2007.
- PATRICK, D.L., CHEADLE, A., THOMPSON, D.C., DIEHR, P., KOEPEL, T., AND KINNE, S. The validity of self-reported smoking: A review and meta-analysis. *Amer. J. Publ. Hlth* **84**: 1086-1093, 1994.
- RADLOFF, L. The CES-D scale: A self-report depression scale for research in the general population. *Appl. Psychol. Meas.* **1**: 385-401, 1977.
- SAITZ, R., FREEDNER, N., PALFAI, T.P., HORTON, N.J., AND SAMET, J.H. The severity of unhealthy alcohol use in hospitalized medical patients: The spectrum is narrow. *J. Gen. Intern. Med.* **21**: 381-385, 2006.
- SAITZ, R., PALFAI, T.P., CHENG, D.M., HORTON, N.J., FREEDNER, N., DUKES, K., KRAEMER, K.L., ROBERTS, M.S., GUERRIERO, R.T., AND SAMET, J.H. Brief intervention for medical inpatients with unhealthy alcohol use: A randomized, controlled trial. *Ann. Intern. Med.* **146**: 167-176, 2007.
- SCHMIDT, L.A., YE, Y., GREENFIELD, T.K., AND BOND, J. Ethnic disparities in clinical severity and services for alcohol problems: Results from the National Alcohol Survey. *Alcm Clin. Exp. Res.* **31**: 48-56, 2007.

- SMITH, K.L., HORTON, N.J., SAITZ, R., AND SAMET, J.H. The use of the minimal state examination in recruitment for substance abuse research studies. *Drug Alcohol Depend.* **82**: 231-237, 2006.
- SOBELL, L.C. AND SOBELL, M.B. Timeline follow-back: A technique for assessing self-reported alcohol consumption. In: LITTEN, R.Z. AND ALLEN, J.P. (Eds). *Measuring Alcohol Consumption: Psychosocial and Biochemical Methods*, Totowa, NJ: Humana Press, 1992, pp. 41-72.
- SPITZER, R.L., WILLIAMS, J.B., KROENKE, K., LINZER, M., DEGRUY, F.V., III, HAHN, S.R., BRODY, D., AND JOHNSON, J.G. Utility of a new procedure for diagnosing mental disorders in primary care: The PRIME-MD 1000 study. *JAMA* **272**: 1749-1756, 1994.
- U.S. PREVENTIVE SERVICES TASK FORCE. Screening and behavioral counseling interventions in primary care to reduce alcohol misuse: Recommendation statement. *Ann. Intern. Med.* **140**: 554-556, 2004.
- WALTON, M.A., GOLDSTEIN, A.L., CHERMACK, S.T., MCCAMMON, R.J., CUNNINGHAM, R.M., BARRY, K.L., AND BLOW, F.C. Brief alcohol intervention in the emergency department: Moderators of effectiveness. *J. Stud. Alcohol Drugs* **69**: 550-560, 2008.
- WARE, J.E., KOSINSKI, M., AND KELLER, S.D. SF-12: How to Score the SF-12 Physical and Mental Health Summary Scales, 3rd Edition, Lincoln, RI: QualityMetric, 1998.
- WATSON, H.E. A study of minimal interventions for problem drinkers in acute care settings. *Int. J. Nurs. Stud.* **36**: 425-434, 1999.
- WEISNER, C., MERTENS, J., PARTHASARATHY, S., MOORE, C., AND LU, Y. Integrating primary medical care with addiction treatment: A randomized controlled trial. *JAMA* **286**: 1715-1723, 2001.
- WILK, A.I., JENSEN, N.M., AND HAVIGHURST, T.C. Meta-analysis of randomized control trials addressing brief interventions in heavy alcohol drinkers. *J. Gen. Intern. Med.* **12**: 274-283, 1997.