Published in final edited form as:

J Subst Abuse Treat. 2014 March ; 46(3): 346–355. doi:10.1016/j.jsat.2013.10.002.

Motivational Interviewing versus Brief Advice for Cigarette Smokers in Residential Alcohol Treatment

Damaris J. Rohsenow, Ph.D.^{a,b}, Rosemarie A. Martin, Ph.D.^b, Peter M. Monti, Ph.D.^{a,b}, Suzanne M. Colby, Ph.D.^b, Anne M. Day, Ph.D.^b, David B. Abrams, Ph.D.^c, Alan D. Sirota, Ph.D.^{a,c}, and Robert M. Swift, M.D., Ph.D.^{a,c}

^a Providence Veterans Affairs Medical Center, Providence, RI 02908, USA

^b Center for Alcohol and Addiction Studies, Brown University, Providence, RI 02912 USA

^c Brown University Medical School, Providence, RI 02912 USA

Abstract

Residential treatment for substance use disorders (SUD) provides opportunity for smoking intervention. A randomized controlled trial compared: (1) Motivational Interviewing (MI) to Brief Advice (BA), (2) in one session or with two booster sessions, for 165 alcoholics in SUD treatment. All received nicotine replacement (NRT). MI and BA produced equivalent confirmed abstinence, averaging 10% at 1 month, 2% at 3, 6 and 12 months. However, patients with more drug use pretreatment (>22 days in 6 months) given BA had more abstinence at 12 months (7%) than patients in MI or with less drug use (all 0%). Boosters produced 16–31% fewer cigarettes per day after BA than MI. Substance use was unaffected by treatment condition or smoking cessation. Motivation to quit was higher after BA than MI. Thus, BA plus NRT may be a cost-effective way to reduce smoking for alcoholics with comorbid substance use who are not seeking smoking cessation.

Keywords

Smoking cessation; alcoholics; motivational interviewing; brief advice; substance abuse

1. Introduction

Over 85% of alcoholics smoke cigarettes, most smoke more heavily than smokers in the general population and few alcoholics try to quit smoking (Batel, Pessione, Maître, & Rueff, et al., 1995; Daepfen et al., 2000; Hughes, 1996; Kozlowski, Jekine, & Pope, 1986, Burling & Ziff, 1988, Joseph, Nichol, Willenbring, Korn, & Lysaght, 1990). Randomized smoking cessation trials with alcoholics during treatment for substance use disorders (SUD) have mostly not been particularly successful (e.g., Bien & Burge, 1991; Burling, Marshall, & Seider, 1991; Joseph, Nichol, & Anderson, 1993; Joseph, Willenbring, Nugent, & Nelson, 2005; Kalman et al., 2001; Monti, Rohsenow, Colby, & Abrams, 1995). The adverse health

Corresponding author: Damaris Rohsenow, Ph.D., Brown University, Box S121-5, Providence, RI 02912. Phone: 401-864-6648, fax: 401-863-6697, Damaris_Rohsenow@Brown.edu..

Publisher's Disclaimer: This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Work was performed at: Brown University Center for Alcohol and Addiction Studies and The Providence Center in Providence, RI.

consequences associated with both smoking and drinking are exacerbated when the behaviors co-occur (Castellsague et al., 1999; Pelucchi, Gallus, Garavello, Bosetti, & La Vecchia, 2006), and as a result, most smokers with alcohol dependence (AD) die of smoking-related causes (Battjes, 1988; Hurt et al., 1996; Zacny, 1990). Thus, identifying ways to assist alcoholics in smoking cessation is critically important.

There are two notable barriers to regular inclusion of smoking cessation interventions for alcoholics in treatment. One is a common belief that efforts to quit smoking will have harmful effects on sobriety (cf. Monti et al., 1995; Rohsenow, Colby, Martin, & Monti, 2005). However, quitting smoking does not necessarily affect drinking outcomes (Burling, Burling & Latini, 2001; Carmody et al., 2012; Cooney et al., 2007; Nieva, Ortega, Mondon, Ballbè, & Gual, 2010), and can actually have beneficial effects on sobriety (Baca & Yahne, 2009; Sobell, Sobell, & Kozlowski, 1995; Bobo, McIlvain, Lando, Walker, & Leed-Kelly, 1998; Tsoh, Chi, Mertens, & Weisner, 2011). This barrier needs to be addressed when intervening with smoking in SUD settings.

The second barrier is that most smokers in AD treatment have little motivation to quit smoking (Flach & Diener, 2004; Monti et al., 1995). While there are also reports that smokers with AD do often consider smoking cessation (Burling, Ramsey, Seidner, Kondo, 1997; Irving, Seidner, Burling, Thomas, & Brenner, 1994; Sees & Clark, 1993; Seidner, Burling, Gaither, & Thomas, 1996), they may need additional motivation to engage in an attempt to quit. Low pretreatment motivation predicts low success for smoking cessation in smokers with SUD (Rohsenow, Martin, Tidey, Monti, & Colby, 2013). Treatment approaches designed to enhance motivation may be particularly relevant for this population, then, and SUD treatment provides a window of opportunity to intervene with smoking that should not be ignored. Two methods proposed within the general population for increasing motivation to attempt quitting are brief advice (BA) and motivational interviewing (MI), also called motivational enhancement therapy.

BA based on the Agency for Healthcare Research and Quality (AHRQ) guidelines is a standardized procedure involving brief advice to quit smoking with brief counseling about methods, recommended for smokers in primary care settings (Coleman, 2004; Hollis, Lichtenstein, Vogt, Stevens, & Biglan, 1993; Katz, Muehlenbruch, Brown, Fiore, & Baker, 2004; Manley, Epps, Husten, Glynn, & Shopland, 1991). The approach requires relatively little training, assessment or time, and follows a format of assessing smoking, advising the person to quit, providing assistance with quitting, and conducting follow-up or booster sessions. Reviews and meta-analyses with smokers in general show a 30% increase in odds of quitting with BA (Fiore et al., 2000; Rigotti, 2002).

MI (Miller & Rollnick, 1991, 2002) involves a certain therapist style (empathic, pseudo-nondirective, non-confrontational) and, in most studies, objective feedback about effects of the substance on the individual. MI for drinking results in significant reductions in drinking with generally large effect sizes (Bien, Miller, & Boroughs, 1993; Brown & Miller, 1993; Dermen & Thomas, 2011; Miller, Soverign, & Krege, 1988; Monti et al., 2007). When applied to smoking, however, results have been mixed. With teenagers, MI for smoking cessation has reduced cotinine levels but not point-prevalence abstinence at outcome (Colby et al., 2005), and, in a separate study, reduced cigarettes per day, but only in the short-term (Colby et al., 2012). In a small study with adult smokers in a general medical setting, there was no effect of MI on smoking rate (Colby et al., 1998). A motivational advice intervention produced more quit attempts than did no treatment but not compared to reduction counseling (Carpenter, Hughes, Solomon, & Callas, 2004). Motivational consulting or interviewing in general practice settings without nicotine replacement produced more point-prevalence abstinence than did BA (Butler et al., 1999; Soria, Legido, Escalano, Yeste, & Montoya,

2006). A recent meta-analysis showed that MI works for adult smoking cessation (Heckman, Egleston, & Hofmann, 2010), which means that MI should be investigated as an intervention for smoking with alcoholics in SUD treatment.

The purpose of the present study was to compare the effectiveness of these two different approaches to motivating smoking cessation among smokers with AD recently admitted to a SUD treatment program. A randomized controlled clinical trial compared MI to BA while also investigating whether a single session of either approach was as effective as providing two booster sessions after the initial session. Effects on smoking and substance use outcomes and on process measures were investigated. (While results for a preliminary subset were previously reported (Rohsenow, Monti, Colby, & Martin, 2002), results for all participants are reported here.)

Because individual differences may affect how willing people are to take advantage of motivational advice, two moderator variables were also investigated. (Initial motivation was not predicted to differentially moderate the effects of MI versus BA because both of these approaches are designed to increase motivation level.) First, illicit drug use predicts poorer response to smoking cessation treatment (Stapleton, Keaney, & Sutherland, 2009) so we predicted that alcoholics with greater involvement with comorbid drug use would benefit more from the more intensive MI approach than from the briefer BA approach. Second, we predicted that alcoholics with the heaviest smoking would also benefit more from the more intensive MI approach than from the briefer BA approach, while alcoholics with light to moderate smoking or with little or no comorbid involvement with drug use would benefit equally from either treatment approach.

2. Materials and Methods

2.1 Participants

2.1.1 Site—The clinical site was a state-funded inner-city residential substance abuse treatment program with state-wide catchment. The 30 to 45 day abstinence-oriented program provided SUD education in a group format based on 12-Step models, with aftercare available. We held in-service training with clinical staff about the benefits of smoking cessation for people with SUD, as recommended by Bobo, Walker, Lando, McIlvain, and Anderson (1995) as a way to prevent staff from undercutting smoking cessation efforts in SUD programs. (Smoking was not addressed in the program per agreement with the agency but any patient could participate in our smoking groups without being in research. Smoking was allowed outdoors).

2.1.2 Eligibility Criteria—A trained research therapist determined eligibility and diagnosis. Patients were eligible if they met current AD criteria (see 2.4.3), smoked at least 10 cigarettes per day for the past 6 months, and were not using nicotine replacement or bupropion. Patients were excluded if they were psychotic, actively suicidal, terminally ill, cognitively impaired (unable to understand informed consent when tested on comprehension; none excluded for this), or could not read. Recruits were told the study would provide “informational sessions about smoking” without requiring cessation.

2.2 Overview of Procedures

The design was a 2×2 (MI vs. BA by boosters vs. no boosters) randomized controlled clinical trial. Informed consent occurred on the second day of the program, with assessments conducted at baseline and 1, 3, 6 and 12 months after intervention started. Randomization to MI or BA and to booster sessions vs. no boosters within each gender occurred in the first week of the program using a random numbers table. Assignment was placed in a sealed

envelope opened just before the first treatment session. Assessments and study treatment occurred during patients' free time so no patients were pulled out of usual program activities. Clinical staff and research interviewers were blind to treatment condition. While participants could not be blind to booster condition, the treatment content was described only as two types of informational sessions with no other information about differences, and they were not told the name of the treatment they received. All procedures were approved by the Institutional Review Boards of Brown University, the Providence Veterans Affairs Medical Center, and The Providence Center.

2.3 Interventions

2.3.1 Procedures applying to both MI and BA—Both interventions were fully manualized and audiotaped. Booster sessions (5 - 15 min. each) were scheduled for 7 and 30 days after the initial session. All participants were informed of free access to nicotine replacement therapy (NRT; transdermal nicotine or nicotine gum) if medically eligible and willing to cease smoking while using it, smoking cessation pamphlets, smoking cessation skills groups, and hard candy.

2.3.2 Motivational Interviewing—MI used motivational therapist style with assessment feedback, based on Miller & Rollnick (1991). The initial session (45 min) involved discussing pros and cons of smoking, interpreting health risks of their carbon monoxide (CO) level, costs of smoking relative to their income, smoking rate compared to state and national norms, relationship of smoking to ongoing alcohol use and to sobriety, and their barriers to change (Asher et al., 2003) with corrective information (since more barriers are associated with lower motivation, Martin, Rohsenow, MacKinnon, Abrams, & Monti, 2006). Patients chose stage-appropriate goals and methods from a menu of suggestions, and smoking cessation pamphlets. At booster sessions, patients were asked about progress toward their own goals, barriers and ways to overcome barriers, successes (focusing on self-efficacy), and revised goal preferences. The second booster session also reviewed updated feedback from the 1-month assessment.

2.3.3 Brief Advice—BA used AHRQ-recommended methods (Manley et al., 1991; Hollis et al., 1993). In the initial session (about 15 min), therapists assessed smoking rate and interest in quitting, directly advised patients to stop smoking now during SUD treatment for their health, assisted by giving advice about useful methods (quit date, nicotine replacement, support from family/friend, community resources, groups on site), and asked them to set a quit date within the next 2 weeks. If they expressed concern about effects on sobriety, they were given corrective information. They were given a consumer guide for smoking cessation and list of smoking services in our state, and were encouraged to select from an array of pamphlets on smoking cessation. Booster sessions checked on progress toward smoking cessation, engaged in problem-solving around barriers (including concerns about effects on substance use), noted successes in accomplishing goals in terms of methods to continue using, repeated direct advice to quit smoking for their health, and reminded them of methods available including the pamphlets.

2.3.4 Therapists and monitoring—Interventions were provided by one of three research therapists (one bachelors' and two masters' level), with each conducting both types of treatment. Therapists received 30 hours of training in MI including supervised role-plays and practice with the treatment manual, conducted by the first author who had received 2-day MI training from Steven Rollnick. Training in BA involved 10 hours of training and role-played practice. Treatment session audiotapes (24% of initial sessions, 19% of booster sessions) were reviewed in weekly group supervision with Dr. Rohsenow and a treatment

coordinator, and rated for MI style and adherence to the manual (see 2.4.4), with immediate feedback to therapists to prevent drift.

2.4 Assessments

2.4.1 Assessment procedures—Research interviewers blind to treatment condition conducted all assessments. Follow-up interviews, in person, were 1, 3, 6 and 12 months after the initial session. The 1 month assessment was scheduled for about 28 days after the initial treatment session. Therapists were told as soon as this was completed so they could contact patients randomized to boosters while keeping the assessors blind to this activity. Participants with a breath alcohol reading $> .02$ g/dL (using Alco Sensor IV by Intoximeters) were rescheduled, follow-up interviews were conducted away from the clinical site after discharge, and all were assured that clinical staff would not be informed of the information provided, per Sobell and Sobell (1986). Participants received \$35, \$40, \$45, and \$50 for the 1, 3, 6, and 12 month interviews, respectively; significant others received \$15 per assessment for their time and travel.

2.4.2 Outcome measures—A Timeline Followback interview (Brown et al., 1998; Ehrman & Robbins, 1994; Sobell & Sobell, 1980) was used at baseline (for 6 months pre-admission) and follow ups (for the period since the previous interview) to collect daily data on smoking, alcohol, and other drugs, scored for number of days of use and number of cigarettes per day. A family member or close friend was interviewed about the patient's substance use to provide a “bogus pipeline” (Sobell & Sobell, 1986). Urine drug screens (On Trak® test cups for screening confirmed with EMIT, gas chromatography and mass spectrometry) were conducted at follow-up. To count as abstinent from smoking, 7-day self-report abstinence needed to be confirmed with a CO level ≤ 10 ppm (using EC50 Micro III Smokerlyzer by Bedfont). To count as abstinent from drugs, both self-report and urine drug screen must have been negative. (See data analysis section for handling missing data and data imputation methods.)

2.4.3 Individual difference measures—Current SUD diagnoses were made using the criteria of the Structured Clinical Interview for DSM-IV-Patient version (First, Spitzer, Gibbon, & Williams, 1995), administered by trained research interviewers. At baseline we administered a smoking history questionnaire, breath CO, and the Fagerström Test for Nicotine Dependence (FTND; Heatherton, Kozlowski, Frecker, & Fagerström, 1991). Responses to the 5-question stage of change algorithm (Prochaska & DiClemente, 1992) were given to research therapists. MI feedback forms included current number of cigarettes per day (with current annual cost to them), CO level at baseline (with health interpretations), and information from the following measures: Smoking Temptations Questionnaire (Velicer, DiClemente, Rossi, & Prochaska, 1990), Nicotine and Other Substance Interaction Expectancy Questionnaire (Rohsenow, Colby, Martin, & Monti, 2005), Barriers to Quitting Smoking in Substance Abuse Treatment (BQS-SAT; Asher et al., 2003).

2.4.4 Process and treatment delivery measures—At baseline and at 1-month we assessed motivation to quit smoking using the Smoking Contemplation Ladder, a single 10-point fully-anchored scale from 1 (no interest in quitting) to 10 (I have quit smoking and will never smoke again) (Biener & Abrams, 1991; Amodei & Lamb, 2004). During treatment we recorded use of nicotine replacement, the number of smoking cessation groups attended at the treatment site, and length of stay per agency records. At 1 and 3 months we assessed number of days of use of nicotine replacement since discharge using the TLFB, to combine with the within-treatment data. Treatment sessions were rated by the treatment coordinator (primary rater) or the first author on 1 (not at all) to 5 (extensively) scales for five motivational style measures (arguing, demonstrating empathy, reflective listening,

supporting self-efficacy, emphasizing personal responsibility for change), and supervisors endorsed adequacy of six MI adherence items (discuss ambivalence [pros and cons, goal discrepancies], discuss feedback about smoking effects, explore barriers to change, provide summaries, discuss various goals, discuss methods).

2.5 Data Analysis Approach

2.5.1 Preliminary analyses—All analyses were conducted using IBM SPSS Statistics® for mainframe or for PC except that multiple imputation analyses were run using MIANALYZE procedures (SAS/STAT, 2013). All variables were checked for assumptions of normality and outliers, and other assumptions underlying regression. (Log transformation was required only for number of drug and alcohol use days at 1 month, when 84% reported no use; the variable remained somewhat skewed, skewness = 2.73. All other requirements for regression and analysis of variance were met. Untransformed values are presented for ease of interpretation.)

Handling missing data: People with a CO > 10 ppm or missing CO data or missing follow-up data or dead or with self-reported smoking were coded as having smoked (Hughes et al., 2003; Lamb et al., 2010) with the following exception: if the participant was in prison, self-report was accepted since biological verification equipment was not allowed so lack of verification was unrelated to participant decision. People claiming abstinence from drugs with a positive, missing or contaminated drug screen and those lost to follow-up were coded as having used drugs for that follow-up interval with the following exception: if the participant was in prison (see Table 1), self-report was accepted since urine samples were not allowed so lack of verification was unrelated to participant decision (Brown et al., 2009). For people whose drug abstinence was disconfirmed by urine testing, regression estimation was used to estimate their number of drug use days during that period, based on their baseline drug use days because these people were known to have used. Since positive imputation could lead to false positives, outcome analyses were re-run using multiple imputation methods (per Higgins & Green, 2011) to provide sensitivity analyses (Rosenbaum, 2005). We imputed data for those missing verified abstinence, average cigarettes per day or number of days that any drugs was used at each follow up. Multiple imputation provides a method for handling missing data where missing values are imputed for each missing variable to complete the data (Rubin, 1987). Multiple imputation was performed for the outcome variables using multiple linear or logistic regression plus a random component to produce the imputed values. Five imputed data sets were generated to yield estimates that were 95% efficient (Rubin, 1987; Schafer & Graham, 2002). Separate regression analyses were performed using all five of the imputed data sets, and the final results represent the effect sizes averaged across the five sets of estimates. Since none of these sensitivity results differed in significance level from the analyses without multiple imputation, analyses with multiple imputation are not presented.

2.5.2 Analyses of outcome—Analyses of the full intent-to-treat sample were conducted using 2×2 (treatment type by booster assignment) logistic regressions for dichotomous outcome variables (e.g., smoking abstinence) and analyses of variance (ANOVA) for continuous process and outcome variables. Sequential logistic regressions using the Wald statistic as the basis for significance testing (Tabachnick & Fidell, 2013) entered the treatment and booster terms on the first step and the interaction term on the second step. Results were analyzed for each time period separately because initial effects could occur that dissipate later (e.g., Rohsenow et al., 2000) or vice versa and combining data could obscure time-sensitive effects.

Because pretreatment heavy smoking or frequent drug use could affect response to treatment, patient-treatment matching analyses were conducted with these variables. In these moderator analyses, the potential matching variable was dichotomized and entered as a third factor in a $2 \times 2 \times 2$ ANOVA or logistic regression. The logistic regressions entered the matching variable, treatment and booster conditions in the first step, and the three 2-way interaction terms on the second step (numbers were too small for a meaningful 3-way interaction analysis). Significant interaction effects of ANOVAs were followed up with simple effects tests and for logistic regressions were followed up with chi square tests.

Effect sizes are calculated as h for categorical variables and f for continuous variables (Cohen, 1988). Effects sizes for h between .50 and .79 and effects sizes for f between .25 and .39 are considered to be medium in size, with larger values considered large and smaller values considered small effects (Cohen, 1988). The study had 80% power to detect a medium effect size in abstinence, 89% power for continuous outcome variables (Cohen, 1988).

Two outcome measures for smoking were chosen: 7-day point-prevalence abstinence as confirmed with CO (per Hughes et al., 2003) and number of cigarettes per day (to detect reductions in smoking short of abstinence). One substance use outcome variable was used: number of days of alcohol and/or drug use during each follow-up period. One smoking moderator was chosen based on distribution (nearest cut-point above the mean): very heavy smoking defined as >25 cigarettes per day (38% of participants) vs. less smoking (Centers for Disease Control, 2005). Only interactions with a moderator are of interest, not main effects of pretreatment smoking on smoking outcome (people who smoked more pretreatment also smoked more during follow up). One substance-related moderator was chosen: comorbid pretreatment drug use days, divided by median split into < 22.5 vs. 22.5. Dichotomized variables were chosen as being easier for clinicians to apply in practice since interactions with continuous variables do not provide clinical guidance as to how to apply them without a computer algorithm. Reanalysis using pretreatment drug use days as a continuous variable (in case the additional power was needed to detect moderation) resulted in essentially the same results (except for cigarettes per day, where results were not interpretable) so only the approach that is more informative to clinicians was reported except for cigarettes per day.

2.5.3 Analyses of process measures—Effects of treatment and booster condition on process measures were investigated using 2×2 treatment type by booster condition analysis of covariance (ANCOVA) for Contemplation Ladder at one-month follow-up, covarying pretreatment Ladder value; 2×2 treatment type by booster condition ANOVA for number of smoking groups attended; and 2×2 treatment type by booster condition logistic regressions for use of NRT during the first month and months 2-3 of follow-up. Covariance was used instead of change scores because change scores increase error variance (Kessler, 1977).

3. Results

3.1 Sample Size and Attrition

Of eligible patients, 200 (72%) consented, and 165 (83% of the consented) stayed at the site long enough to be randomized to treatment (the intent-to-treat sample). (See Figure 1 for flow chart.) Of these, 80 were assigned to MI and 85 were assigned to BA; all received their assigned treatment. Of the 83 randomized to receive booster sessions, 68 (82%) attended the 1-week booster and 43 (52%) attended the 1-month booster (no significant differences by treatment type). Mean number of days in the residential program was 44.4 ± 20.6 [S.D.] (no significant difference between treatment conditions). Of 165 randomized to treatment, 1-mo

follow-up was completed by 140 (85%), 3-mo follow-up was completed by 131 (79%), 6-mo follow-up was completed by 123 (75%), and 12-mo follow-up was completed by 113 (69%), with no significant differences by condition. ANOVAs or χ^2 analyses showed no differences between those who completed the follow-up versus those who did not complete the follow-up at each time on demographic variables (race, gender, age, education) or clinical variables (FTND, number of drinking days) except those who completed the follow-up interview at 1 month, 3 months, and 12 months were more likely to have a co-morbid drug diagnosis (90%, 84%, 78% respectively) than those who did not complete the follow-up (71%, 66%, 64% respectively), at 1 month $\chi^2(1) = 9.67, p < .05$, at 3 months $\chi^2(1) = 6.67, p < .05$, and at 12 months $\chi^2(1) = 7.31, p < .05$. Collection of CO data did not differ significantly by treatment condition, with 27% at 1 month, 34% at 3 months, 31% at 6 months, and 34% at 12 months missing CO readings for any reason. Interviews were conducted at prison/jail for 1% at 1 month, and for 6% at 3, 6 and 12 months. No serious adverse events related to the study occurred.

3.2 Participant Characteristics

Mean age was 33.7 ± 7.6 years; 88% were white, 11% were black, 1% were of other races; 2% were Hispanic; 60% were male; 14% were married or living with a romantic partner. In addition, participants' mean education level was 12.2 ± 2.3 years; 80% were currently unemployed, and their mean legal income was $\$17,728 \pm 22,231$ in the past year. At pretreatment, participants showed a CO level of $M = 24 \pm 10$ ppm; smoked $M = 21 \pm 8$ cigarettes/day; had a mean FTND score of 5.7 ± 2.0 . They had been smoking daily on average 19.5 ± 7.8 years. Most (73%) also had current drug diagnoses (48% cocaine abuse or dependence, 35% opiate abuse or dependence, and 38% marijuana abuse or dependence). Participants drank 9.35 ± 10.54 drinks per day, drank on $46\% \pm 30\%$ of days, and used drugs $32\% \pm 32\%$ of days during the 6 months pretreatment. Treatment by Booster ANOVAs or χ^2 analyses showed no differences between conditions for demographic variables or any pretreatment smoking or substance use variable (see Table 1 for values by treatment condition).

3.3 Confirmation of Abstinence

Of people reporting 7-day abstinence from smoking at each follow-up, 17 out of 19 at 1 mo., 3 out of 3 at 3 mo., 4 out of 5 at 6 mo., and 3 out of 3 at 12 mo. were confirmed abstinent by CO level. Of people reporting abstinence from drugs at each follow-up, 3% (3 of 114) at 1 mo., 30% (17 of 57) at 3 mo., 17% (10 of 59) at 6 mo., and 35% (15 of 43) at 12 mo. were identified as using drugs by urine screen.

3.4 Treatment Style and Adherence Ratings by Supervisor

Therapist style ratings did not differ significantly between treatment conditions for arguing (on average not at all), but in MI therapists showed significantly more empathy, used more reflective listening, supported self-efficacy more, and emphasized personal responsibility more ($ts(54)$ from 10.48 to 14.02, $ps < .001$). Therapists were significantly more likely in MI vs. BA to discuss topics to increase ambivalence (100% of MI, 4% of BA sessions), provide assessment feedback (100% of MI, 0% of BA sessions), explore barriers (82.1% of MI, 0% of BA sessions), provide summaries (100% of MI, 0% of BA sessions), and discuss possible goals (100% of MI, 14.8% of BA sessions), all $\chi^2(n = 56, df = 1) > 37.23$, all $ps < .001$. Conditions did not differ in discussing methods (100% of MI, 96.2% of BA sessions).

3.5 Treatment Outcomes

3.5.1 Smoking abstinence by condition: all participants—Confirmed 7-day point-prevalence smoking abstinence averaged 10.3% at 1 mo., 1.8% at 3 months, 2.4% at 6

months, and 1.8% at 12 months. Logistic regressions were nonsignificant for treatment or booster effects (see Fig. 2). The only statistical trends were for booster sessions to result in more abstinence than no boosters at 3 months (model $\chi^2(2) = 4.66$, univariate $\chi^2(1) = 3.09$, $p < .08$, $h = .40$) and for BA to result in more abstinence than MI at 12 month follow-up (model $\chi^2(2) = 4.36$, univariate $\chi^2(1) = 2.88$, $p < .09$, $h = .40$), both small effect sizes. (See Fig. 2.)

3.5.2 Smoking abstinence: patient-treatment matching—Logistic regressions entering dichotomized pretreatment drug use days as a factor were nonsignificant for the 1, 3 and 6-mo. follow-ups. At 12 months, the regression was significant (model $\chi^2(3) = 8.47$, $p < .04$) with no one significant term. To investigate this significant effect, univariate χ^2 tests of each treatment condition within each level of drug use were conducted (see Fig. 3). These univariate tests showed that the only abstainers at 1 year were patients with greater pretreatment drug use who received BA (7% of group, vs. 0% in other three groups), $\chi^2(1) = 3.77$, $p < .05$ (likelihood ratio method due to cell sizes of zero), a medium sized effect ($h = .54$).

Logistic regressions rerun entering heavy smoking as a third factor were nonsignificant. Exploratory analyses entering non-alcohol drug use diagnosis as a third factor were also non-significant (considered exploratory because only 27% had no such diagnosis, making the sample sizes quite small in some cells).

3.5.3 Cigarettes per day by condition: all participants—The 2×2 ANOVAs on number of cigarettes per day at each follow-up period were nonsignificant.

3.5.4 Cigarettes per day: patient-treatment matching—ANOVAs adding baseline heavy smoking as a patient-treatment matching variable resulted in significant effects at 3, 6 and 12 months. (The 3-way interactions will not be reported, and main effects of pretreatment smoking rate on smoking during follow-up are not of interest.) At 3 months, the main effect for baseline heavy smoking was significant ($F(1,123) = 6.12$, $f = .21$) and the treatment type by booster condition interaction term was significant ($F(1,123) = 5.62$, $f = .22$, $ps < .02$). Without a booster, the 3-month cigarettes per day were equivalent between treatment types ($n = 38$ and 29) but among those assigned to booster conditions less smoking was done after BA ($M = 10.3 \pm 7.4$; $n = 32$) than after MI ($M = 14.9 \pm 9.1$ cigarettes/day; $n = 32$), $p < .05$. At 6 months, only the main effect for baseline heavy smoking was significant ($F(1,115) = 18.14$, $p < .001$, $f = .39$). At 1-year, the treatment type by booster condition interaction was significant ($F(1,105) = 4.31$, $p < .04$, $f = .20$) and the main effect for baseline heavy smoking group ($F(1,105) = 13.43$, $p < .01$, $f = .35$). Follow-up tests of the 2-way interaction showed that treatment type effects were significantly different only for those in the booster condition: For those who received boosters, less smoking was done at 1 year after BA ($M = 14.3 \pm 7.7$ cigarettes per day; $n = 28$) than after MI ($M = 17.1 \pm 10.0$ cigarettes per day; $n = 29$).

Analyses of cigarettes per day entering dichotomized number of drug use days on the first step showed significant effects at 1 and 6 months. At 1 month, the interaction of treatment type and drug use group was significant ($F(1,131) = 4.06$, $p < .05$, $f = .18$) but simple effects tests showed no treatment differences significant within either drug use group. At 3 months, analyses were nonsignificant. At 6 months, the booster condition by dichotomized drug use group interaction was significant ($F(1,115) = 3.94$, $p < .05$, $f = .18$) but simple effects tests showed no significant booster differences within either drug use group.

Using pretreatment drug use days as a continuous variable, at 1 month the interaction of booster condition and the number of pretreatment drug use days was significant ($F(1,134) =$

5.25, $p < .05$, $f = .19$). Since pretreatment drug use days is a continuous variable, three values of this variable (the mean, one standard deviation above the mean, and one standard deviation below the mean) were chosen at which to examine the interaction effect (Cohen, 1983). These analyses showed no booster treatment group differences significant at the selected values. At 3 months, the MI condition by pretreatment drug use days interaction was significant ($F(1,126) = 4.1$, $p < .05$, $f = .17$) but simple slopes analyses described above showed no significant MI group differences at the selected values of pretreatment drug use days. At 6 months, the analysis was nonsignificant. Thus, neither method of handling pretreatment drug use days resulted in interpretable interactions for cigarettes per day.

3.5.5 Substance use outcomes—ANCOVAs on number of days with any alcohol or drug use were nonsignificant at each time period. In addition, because treatment personnel sometimes ask if quitting smoking would worsen substance use outcomes (Monti et al., 1995), ANCOVAs were conducted to determine the relationship of tobacco abstinence at each follow-up on substance use days during the window preceding the assessment (covarying pretreatment substance use days). Analyses at each follow-up period were nonsignificant.

3.5.6 Exploring gender differences—Analyses were rerun entering sex as a factor, with no significant main or interaction effects for sex.

3.6 Process Measures

3.6.1 Motivation Ladder—At 1 month, there was a trend for a treatment effect on Contemplation Ladder in the 2×2 ANCOVA ($F(1, 117) = 3.71$, $p < .06$, $f = .18$), with covariate adjusted mean scores tending to be higher after BA ($M = 6.96 \pm 1.78$) than MI ($M = 6.37 \pm 2.03$). On this measure a 6 is “I definitely plan to quit smoking in the next 6 months” while a 7 is “I definitely plan to quit smoking in the next 30 days”. Entering pretreatment heavy smoking as a third factor resulted in a significant main effect for treatment ($F(1,113) = 5.24$, $p < .03$, $f = .21$). Adjusted mean scores were higher after BA ($M = 6.99 \pm 1.78$) than MI ($M = 6.19 \pm 2.03$). (See Fig. 4.)

Using dichotomized drug use days as the third factor resulted in a significant interaction of pretreatment drug days with booster sessions ($F(1,113) = 5.07$, $p < .03$, $f = .21$). Simple effects tests showed that people with fewer pretreatment drug use days had higher covariate-adjusted 1-month Ladder scores after boosters ($M = 7.0 \pm 1.8$) than with no boosters ($M = 6.2 \pm 3.0$; $F(1,117) = 3.83$, $p < .05$) while people with more pretreatment drug use did not differ significantly in covariate-adjusted Ladder scores with no boosters ($M = 7.1 \pm 1.8$) compared to boosters ($M = 6.5 \pm 2.0$).

3.6.2 Smoking Group Attendance—At least one smoking cessation group meeting was attended by 34.2% of participants, with no difference in percentage who attended by treatment or booster conditions in a logistic regression.

3.6.3 NRT Use—NRT was used by 50.7% of participants in the first month, by 33.6% in the next 2 months. NRT use did not significantly differ by treatment type or booster condition at 1 month in a logistic regression, but the treatment step was significant for 3 month NRT use, model $\chi^2(2) = 7.09$, $p < .03$. Within this step, booster condition was significant, Wald (1) = 1.23, $B = 0.95$, $p < .02$, with 43.8% of those assigned to boosters using NRT compared to 23.9% of those assigned to receive no boosters. (See Fig. 5). Treatment type and the interaction were not significant. Everyone who was confirmed abstinent from cigarettes at 1 month was still using NRT and 66.7% of those abstinent at 3 months were still using NRT.

4. Discussion

Brief advice to quit and motivational interviewing were attractive to many smokers with AD in SUD treatment. Of the patients with AD in residential treatment who smoked at least 10 cigarettes per day, 72% consented to a study that would give them information about their smoking without requiring cessation, a remarkably high rate given that very few are ready to quit smoking while in residential treatment. At the same time, most did not want smoking cessation groups, as indicated by overall low attendance at these. Thus, patients with AD in residential SUD treatment may be receptive to low pressure and brief approaches to learning about effects of their smoking and methods of quitting when also offered free nicotine replacement. Such programs may provide a window of opportunity to attempt to increase smoking cessation in this population.

Both MI and BA may increase the number of patients with AD who seriously try to quit smoking. MI and BA were equivalently effective overall, with confirmed 7-day abstinence for 10% of those enrolling in the smoking information program at 1 month and 2% at 3, 6 and 12 months. In contrast, a number of previous studies of alcoholics that did not provide smoking cessation information, advice or assistance found no patients with AD to quit within 6 months (e.g., Gulliver et al., 2000; and unpublished data from Monti et al., 1993 and 2001, and from Rohsenow et al. 2000, 2003, 2004). While long term abstinence rates are lower than for those seen with smoking treatment studies that enroll smokers who are already willing to quit smoking, some long-term impact on smoking can occur in this difficult-to-treat population with relatively little time involvement. Possibly, higher abstinence rates might be obtained with more intensive abstinence-induction methods (such as contingency management) or more effective pharmacotherapies (such as varenicline).

While overall there were no significant differences in MI versus BA with or without boosters, when potential moderating variables were entered into the analyses, some significant differences in effectiveness of the two treatment approaches were apparent favoring BA. At the 12-month follow up, BA given to alcoholics with more comorbid drug use pretreatment resulted in 7% of them confirmed abstinent from smoking. Alternatively, all alcoholics were smoking 12 months after MI, and alcoholics with little or no comorbid drug use pretreatment were all smoking 12 months after BA. While contrary to our prediction, it may be that alcoholics in treatment who are also struggling with more drug use at treatment entry are more receptive to the idea of giving up all drugs including nicotine while alcoholics with little other drug use may think of alcohol as their only problematic drug. The fact that comorbid drug diagnosis was associated with higher follow-up rates is consistent with greater engagement on the part of the patients with both AD and other SUD. When variance due to pretreatment heavy smoking was controlled by entering it as a factor in the analyses, participants assigned to receive booster sessions smoked fewer cigarettes per day at 3 and 12 months after treatment if they received BA compared to MI. Without booster sessions, differences between BA and MI were not significant in this analysis. BA was also more effective than MI in increasing self-reported motivation to change smoking in the first month in this population, important since motivation (Contemplation Ladder) predicts smoking cessation during treatment in smokers in SUD treatment (Rohsenow et al., 2013).

BA may be more effective than MI for more drug-involved alcoholics because the strong authoritative advice message of BA is more consistent with the SUD treatment program's consistent strongly worded messages to give up all harmful substances. MI's non-authoritarian approach to advice, that the decision is up to them, may be easier to ignore in this context. BA is less costly to administer given that it takes about 1/8 the amount of staff time than do the assessments plus treatment time involved in MI, thus making it attractive to

clinical programs. The results and low cost are supportive of the use of BA in this population in SUD programs.

Given that BA is as effective or, for some alcoholics, more effective than MI, that it results in greater motivation to change smoking, and that it costs less in staff time, BA appears to be the preferable choice to implement. The booster sessions recommended by AHRQ guidelines appeared to increase the effectiveness of BA for reducing cigarettes per day but not abstinence. The public health impact of an intervention is a function of population reach times efficacy (Abrams et al., 1996). Given a reach of about 75% of alcohol dependent patients unmotivated to quit smoking who will participate in this kind of smoking program, then even with a modest efficacy (2-7%) there could be enormous public health impact if even a single session of BA were adopted in all SUD treatment programs nationwide.

Free NRT was popular with these alcohol-dependent smokers, with 51% using it in the first month of treatment and 34% using it in the subsequent two months. NRT was used by all who did quit smoking in the first month, so it is probably useful to supply it to any willing to try it as none were able to quit without it. For almost all who used it, transdermal nicotine was the NRT of choice while a few preferred the gum. Booster sessions increased the likelihood of using NRT: NRT was used more from 2-3 months after the first smoking intervention by people who were assigned to receive booster sessions (82% of whom received at least one of the booster sessions). However, NRT use was not significantly more or less likely when given BA than MI.

Smoking cessation groups were provided in the program as a way to assist anyone who became willing to quit smoking. However, such groups were unpopular, with only 34% of participants attending even one group session, probably due to low motivation to quit smoking. Neither treatment type nor booster availability significantly affected whether patients attended smoking groups. One reason why smoking cessation groups may be unpopular is that patients in SUD treatment already have or are receiving considerable information about ways to handle withdrawal and cravings for alcohol and drugs, and such information is easy to generalize to smoking. Also, the tobacco-specific information may have been more efficiently obtained from the pamphlets we provided. Furthermore, with the large number of groups they already were required to attend, another group experience may be aversive in this context even if the information was desired. The brief individual attention was welcomed in this program where most treatment involved groups. Therefore, brief individual smoking counseling can be attractive in this type of setting whereas a smoking group may not be welcome.

Neither treatment type nor success in quitting smoking significantly affected the frequency of substance use during follow up. Many counselors over the years have raised effects on sobriety as a concern, which is why data on this issue need to be disseminated to SUD counselors. The fact that the program directors supported our smoking interventions also gave an implicit message that smoking cessation would not harm sobriety. Our results are inconsistent with harmful effects on outcomes found for a mandatory smoking cessation program (Josephs et al., 1993) but consistent with studies showing that smoking cessation within 6 months of quitting drinking is harmless or may correlate with improved sobriety outcomes (Friend & Pagano, 2005; Sobell, Sobell, & Kozlowski, 1995).

A limitation of this study includes involving only an urban inner-city residential SUD treatment program with relatively long length of stay. Programs in suburban or rural areas or outpatient programs might produce different results. A second limitation is that only a relatively brief MI was provided, consistent with the model. It might be that more sessions might have had more impact. A third limitation was starting the MI or BA only early in

substance-abuse treatment; it might be patients would be more open to these approaches a week or two later. A fourth limitation is providing only transdermal nicotine or nicotine gum as pharmacologic aids to cessation. Providing other pharmacologic agents to those who are medically eligible could increase cessation rates, but are not affordable to many in inner-city programs and involve more medical exclusions. A fifth limitation was in not selecting “pure” alcoholics without comorbid drug use and without excluding psychotropic medications. However, we believed this would better represent the population of AD patients in treatment than would a more selective group. It is important to investigate various ways to make smoking cessation more attractive to and effective for alcoholics who smoke, given their high smoking rates and health risks.

Conclusions

BA plus NRT may be a cost-effective way to reduce smoking for patients with alcohol dependence, particularly those with greater comorbid substance use, who are not seeking smoking cessation. Residential treatment provides a window of opportunity for this relatively low cost approach (i.e., little staff time involved) to improving the health of smokers with alcohol dependence. Adding two booster sessions increases smoking reductions for those who do not quit smoking. Future work should investigate ways to improve the effectiveness of this approach, such as by adding the more effective prescription-based medications, or combining the approach with contingent vouchers for abstinence in the first few weeks.

Acknowledgments

This study was supported by a grant from the National Institute of Alcohol Abuse and Alcoholism (1 RO1 AA11318) and by two Senior Research Career Scientist Awards from the United States Department of Veterans Affairs.

Dr. Abrams is now Executive Director of The Schroeder Institute for Tobacco Research and Policy Studies; Professor, Department of Health, Behavior and Society, at The Johns Hopkins Bloomberg School of Public Health; and Professor of Oncology (adjunct), at Georgetown University Medical Center, Lombardi Comprehensive Cancer Center.

Grateful appreciation is expressed to the staff, management and patients of The Providence Center in Providence, RI, for their assistance, and to Cheryl Eaton for her statistical analyses.

Portions of these data were presented at the annual meeting of the Research Society on Alcoholism, Santa Barbara, CA, June 2005, and at the international meeting of the Society of Research on Nicotine and Tobacco, Prague, Czech Republic, March 2005.

The experiment complied with the laws of the United States of America and the principles of the Declaration of Helsinki.

References

- Abrams DB, Orleans CT, Niaura RS, Goldstein MG, Prochaska JO, Velicer W. Integrating individual and public health perspectives for treatment of tobacco dependence under managed health care: A combined stepped-care and matching model. *Annals of Behavioral Medicine*. 1996; 18:290–304. [PubMed: 18425675]
- Amodei N, Lamb RJ. Convergent and concurrent validity of the Contemplation Ladder and URICA scales. *Drug and Alcohol Dependence*. 2004; 73:301–306. [PubMed: 15036552]
- Asher MK, Martin RA, Rohsenow DJ, MacKinnon SV, Traficante R, Monti PM. Perceived barriers to quitting smoking among alcohol dependent patients in treatment. *Journal of Substance Abuse Treatment*. 2003; 24:169–174. [PubMed: 12745034]
- Baca CT, Yahne CE. Smoking cessation during substance abuse treatment: What you need to know. *Journal of Substance Abuse Treatment*. 2009; 36:205–219. [PubMed: 18715746]

- Batel P, Pessione F, Maître C, Rueff B. Relationship between alcohol and tobacco dependencies among alcoholics who smoke. *Addiction*. 1995; 9:977–980. [PubMed: 7663320]
- Battjes RJ. Smoking as an issue in alcohol and drug abuse treatment. *Addictive Behaviors*. 1988; 13:225–230. [PubMed: 3051913]
- Bien TH, Burge R. Smoking and drinking: A review of the literature. *International Journal of Addictions*. 1991; 25:1429–1454.
- Bien TH, Miller WR, Boroughs JM. Motivational interviewing with alcohol outpatients. *Behavioural and Cognitive Psychotherapy*. 1993; 23:347–356.
- Biener L, Abrams DB. The contemplation ladder: Validation of a measure of readiness to consider smoking cessation. *Health Psychology*. 1991; 10:360–365. [PubMed: 1935872]
- Bobo JK, McIlvain HE, Lando HA, Walker RD, Leed-Kelly A. Effect of smoking cessation counseling on recovery from alcoholism: Findings from a randomized community intervention trial. *Addiction*. 1998; 93:877–887. [PubMed: 9744123]
- Bobo, JK.; Walker, RD.; Lando, HA.; McIlvain, HE.; Anderson, JR. Enhancing alcohol control with counseling on nicotine dependence: Pilot study findings and treatment recommendations.. In: Fertig, JB.; Allen, JP., editors. *Alcohol and tobacco: From basic science to clinical practice*. Research Monograph 30, National Institute on Alcohol Abuse and Alcoholism; 1995. p. 225-238.
- Brown JM, Miller WR. Impact of motivational interviewing on participation and outcome in residential alcoholism treatment. *Psychology of Addictive Behaviors*. 1993; 7:211–218.
- Brown RA, Burgess ES, Sales SD, Whiteley JA, Evans DM, Miller IW. Reliability and validity of a smoking timeline follow-back interview. *Psychology of Addictive Behaviors*. 1998; 12:101–112.
- Brown RA, Strong DR, Abrantes AM, Myers MG, Ramsey SE, Kahler CW. Effects on substance use outcomes in adolescents receiving motivational interviewing for smoking cessation during psychiatric hospitalization. *Addictive Behaviors*. 2009; 34:887–891. [PubMed: 19342179]
- Burling TA, Burling AS, Latini D. A controlled smoking cessation trial for substance-dependent inpatients. *Journal of Consulting and Clinical Psychology*. 2001; 69:295–304. [PubMed: 11393606]
- Burling TA, Marshall GD, Seidner AL. Smoking cessation for substance abuse inpatients. *Journal of Substance Abuse*. 1991; 3:269–276. [PubMed: 1668228]
- Burling TA, Ramsey TG, Seidner AL, Kondo CS. Issues related to smoking cessation among substance abusers. *Journal of Substance Abuse*. 1997; 9:27–40. [PubMed: 9494937]
- Burling TA, Ziff DC. Tobacco smoking: A comparison between alcohol and drug abuse inpatients. *Addictive Behaviors*. 1988; 13:185–190. [PubMed: 3369328]
- Butler CC, Rollnick S, Cohen D, Bachman M, Russell I, Stott N. Motivational consulting versus brief advice for smokers in general practice: A randomized trial. *British Journal of General Practice*. 1999; 49:611–616.
- Carmody T, Delucchi K, Duncan CL, Banys P, Simon JL, Hall SM. Intensive intervention for alcohol-dependent smokers in early recovery: A randomized trial. *Drug and Alcohol Dependence*. 2012; 122:186–194. [PubMed: 22014532]
- Carpenter MJ, Hughes JR, Solomon LJ, Callas PW. Both smoking reduction and motivational advice increase future cessation among smokers not currently planning to quit. *Journal of Consulting and Clinical Psychology*. 2004; 72:371–381. [PubMed: 15279521]
- Castellsague X, Munoz N, De Stefani E, Victora CG, Catellette R, Rolon PA, et al. Independent and joint effects of tobacco smoking and alcohol drinking on the risk of esophageal cancer in men and women. *International Journal of Cancer*. 1999; 82:657–664.
- Centers for Disease Control and Prevention. Cigarette smoking among adults – United States, 2004. *Morbidity and Mortality Weekly Report*. 2005; 54:1121–1124. [PubMed: 16280969]
- Cohen, J. *Statistical power analysis for the behavioral sciences*. 2nd ed.. Lawrence Erlbaum Associates, Publishers; New Jersey: 1988.
- Colby SM, Monti PM, Barnett NP, Weissman K, Rohsenow DJ, Spirito A, Woolard RH, Lewander WJ. Brief motivational interviewing in a hospital setting for adolescent smoking: A preliminary study. *Journal of Consulting and Clinical Psychology*. 1998; 66:574–578. [PubMed: 9642898]

- Colby SM, Monti PM, O'Leary TA, Barnett NP, Spirito A, Rohsenow DJ, Lewander W. Brief motivational intervention for adolescent smokers in medical settings. *Addictive Behaviors*. 2005; 30:865–874. [PubMed: 15893085]
- Colby SM, Nargiso J, Tevyaw TO, Barnett NP, Metrik J, Lewander W, Monti PM. Enhanced motivational interviewing versus brief advice for adolescent smoking cessation: Results from a randomized clinical trial. *Addictive Behaviors*. 2012; 37:817–823. [PubMed: 22472523]
- Coleman T. ABC of smoking cessation: Use of simple advice and behavioural support. *BMJ: British Medical Journal*. 2004; 328:397–399.
- Cooney NL, Litt MD, Cooney JL, Pilkey DT, Steinberg HR, Oncken CA. Concurrent brief versus intensive smoking intervention during alcohol dependence treatment. *Psychology of Addictive Behaviors*. 2007; 21:570–575. [PubMed: 18072840]
- Daepfen J, Smith TL, Danko GP, Gordon L, Landi NA, Nurnberger JI, Schuckit MA. Clinical correlates of cigarette smoking and nicotine dependence in alcohol-dependent men and women. *Alcohol and Alcoholism*. 2000; 35:171–175. [PubMed: 10787393]
- Dermen K, Thomas SN. Randomized controlled trial of brief interventions to reduce college students' drinking and risky sex. *Psychology of Addictive Behaviors*. 2011; 25:583–594. [PubMed: 21928866]
- Ehrman RN, Robbins SJ. Reliability and validity of 6-month timeline reports of cocaine and heroin use in a methadone population. *Journal of Consulting and Clinical Psychology*. 1994; 62:843–850. [PubMed: 7962889]
- Flach SD, Diener A. Eliciting patients' preferences for cigarette and alcohol cessation: An application of conjoint analysis. *Addictive Behaviors*. 2004; 29:791–799. [PubMed: 15135562]
- Fiore, MC.; Bailey, WC.; Cohen, SJ.; Dorfman, SF.; Goldstein, MG.; Gritz, ER., et al. *Treating Tobacco Use and Dependence: Clinical Practice Guideline*. Public Health Service: USDHHS; Washington, DC.: 2000.
- First, MB.; Spitzer, RL.; Gibbon, M.; Williams, JBW. *Structured Clinical Interview for DSM-IV Axis I Disorders - Patient Edition (SCID-I/P, Version 2.0)*. Biometrics Research Department, New York State Psychiatric Institute; New York, NY.: 1995.
- Friend KB, Pagano ME. Smoking cessation and alcohol consumption in individuals in treatment for alcohol use disorders. *Addictive Disease*. 2005; 24:61–75.
- Gulliver SB, Rohsenow DJ, Colby SM, Dey AN, Abrams DB, Niaura RS, Monti PM. Interrelationship of smoking and alcohol dependence, use and urges to use. *Journal of Studies on Alcohol*. 1995; 56:202–206. [PubMed: 7760567]
- Heatherton TF, Kozlowski LT, Frecker RC, Fagerström K-O. The Fagerström Test for Nicotine Dependence: A revision of the Fagerström Tolerance Questionnaire. *British Journal of Addiction*. 1991; 86:1119–1127. [PubMed: 1932883]
- Heckman CJ, Egleston BL, Hofmann MT. Efficacy of motivational interviewing for smoking cessation: A systematic review and meta-analysis. *Tobacco Control: An International Journal*. 2010; 19:410–416.
- Higgins, JPT.; Green, S., editors. *Cochrane Handbook for Systematic Reviews of Interventions* Version 5.1.0 [updated March 2011]. The Cochrane Collaboration. 2011. Available from www.cochrane-handbook.org.
- Hollis JF, Lichenstein E, Vogt TM, Stevens VJ, Biglan A. Nurse-assisted counseling for smokers in primary care. *Annals of Internal Medicine*. 1993; 118:521–525. [PubMed: 8442622]
- Hughes JR. Treating smokers with current or past alcohol dependence. *American Journal of Health Behavior*. 1996; 20:286–290.
- Hughes JR, Keely JP, Niaura RS, Ossip-Klein DJ, Richmond RL, Swan GE. Measures of abstinence in clinical trials: Issues and recommendations. *Nicotine & Tobacco Research*. 2003; 5:13–25. [PubMed: 12745503]
- Hurt RD, Offord KP, Croghan IT, Gomez-Dahl L, Kottke TE, Morse RM, Melton LJI. Mortality following inpatient addictions treatment: Role of tobacco use in a community-based cohort. *Journal of the American Medical Association*. 1996; 275:1097–1103. [PubMed: 8601929]
- Irving LM, Seidner AL, Burling TA, Thomas RG, Brenner GF. Drug and alcohol inpatients' attitudes about smoking cessation. *Journal of Substance Abuse*. 1994; 6:267–278. [PubMed: 7703704]

- Joseph AM, Nichol KL, Anderson H. Effect of treatment for nicotine dependence on alcohol and drug treatment outcomes. *Addictive Behaviors*. 1993; 18:635–644. [PubMed: 8178702]
- Joseph AM, Nichol KL, Willenbring ML, Korn JE, Lysaght LS. Beneficial effects of treatment of nicotine dependence during an inpatient substance abuse treatment program. *Journal of the American Medical Association*. 1990; 263:3043–3046. [PubMed: 2342215]
- Joseph AM, Willenbring ML, Nugent SM, Nelson DB. A randomized trial of concurrent versus delayed smoking interventions for patients in alcohol dependence treatment. *Journal of Studies on Alcohol*. 2005; 65:681–691. [PubMed: 15700504]
- Kalman D, Hayes K, Colby SM, Eaton CA, Rohsenow DJ, Monti PM. Concurrent versus delayed smoking cessation treatment for alcoholics: A pilot study. *Journal of Substance Abuse Treatment*. 2001; 20:233–238. [PubMed: 11516593]
- Katz DA, Muehlenbruch DR, Brown RL, Fiore MC, Baker TB. AHRQ Smoking Cessation Guideline Study Group. Effectiveness of implementing the agency for healthcare research and quality smoking cessation clinical practice guideline: a randomized, controlled trial. *Journal of the National Cancer Institute*. 2004; 96:594–603. [PubMed: 15100337]
- Kessler RC. The use of change scores as criteria in longitudinal survey research. *Quality & Quantity*. 1977; 11:43–66.
- Kozlowski LT, Jelinek LC, Pope MA. Cigarette smoking among alcohol abusers: A continuing and neglected problem. *Canadian Journal of Public Health*. 1986; 77:205–207. [PubMed: 3742405]
- Lamb RJ, Kirby KC, Morral R, Galbicka G, Iguchi MY. Shaping smoking cessation in hard-to-treat smokers. *Journal of Consulting and Clinical Psychology*. 2010; 78:62–71. [PubMed: 20099951]
- Manley M, Epps RP, Husten C, Glynn T, Shopland D. Clinical interventions in tobacco control. A National Cancer Institute training program for physicians. *Journal of the American Medical Association*. 1991; 266:3172–3173. [PubMed: 1956107]
- Martin RA, Rohsenow DJ, MacKinnon SV, Abrams DA, Monti PM. Correlates of motivation to quit smoking among alcohol dependent patients in residential treatment. *Drug and Alcohol Dependence*. 2006; 83:73–78. [PubMed: 16314049]
- Miller, WR.; Rollnick, S. *Motivational interviewing: Preparing people to change addictive behavior*. Guilford Press; New York: 1991.
- Miller, WR.; Rollnick, S. *Motivational interviewing: Preparing people for change*. 2nd ed.. Guilford Press; New York: 2002.
- Miller WR, Sovereign RG, Klege B. Motivational interviewing with problem drinkers: II. The drinker's check-up as a preventive intervention. *Behavioral Psychotherapy*. 1988; 16:251–268.
- Monti PM, Barnett NP, Colby SM, Gwaltney CJ, Spirito A, Rohsenow DJ, Woolard R. Motivational interviewing versus feedback only in emergency care for young adult problem drinking. *Addiction*. 2007; 102:1234–1243. [PubMed: 17565560]
- Monti, PM.; Rohsenow, DJ.; Colby, SM.; Abrams, DB. Smoking among alcoholics during and after treatment: Implications for models, treatment strategies and policy.. In: Fertig, JB.; Allen, JP., editors. *Alcohol and tobacco: From basic science to clinical practice*. Research Monograph 30, National Institute on Alcohol Abuse and Alcoholism; 1995. p. 187-206.
- Monti PM, Rohsenow DJ, Rubonis A, Niaura R, Sirota A, Colby S, Abrams DB. Cue exposure with coping skills treatment for male alcoholics: A preliminary investigation. *Journal of Consulting and Clinical Psychology*. 1993; 61:1011–1019. [PubMed: 7906700]
- Monti PM, Rohsenow DJ, Swift RM, Gulliver SB, Colby SM, Mueller TI, Asher MK. Naltrexone and cue exposure with coping and communication skills training for alcoholics: Treatment process and one-year outcomes. *Alcoholism: Clinical and Experimental Research*. 2001; 25:1634–1647.
- Nieva G, Ortega LL, Mondon S, Ballbè M, Gual A. Simultaneous versus delayed treatment of tobacco dependence in alcohol-dependent outpatients. *European Addiction Research*. 2010; 17:1–9. [PubMed: 20881400]
- Pelucchi C, Gallus S, Garavello W, Bosetti C, La Vecchia C. Cancer risk associated with alcohol and tobacco use: Focus on upper aero-digestive tract and liver. *Alcohol Research and Health*. 2006; 29:193–198. [PubMed: 17373408]

- Prochaska, JO.; DiClemente, CC. Stages of change in the modification of problem behaviors.. In: Hersen, M.; Eisler, RM.; Miller, PM., editors. Progress in Behavioral Modification. Sycamore Press; Sycamore IL: 1992.
- Rigotti N. Treatment of tobacco use and dependence. The New England Journal of Medicine. 2002; 346:506–512. [PubMed: 11844853]
- Rohsenow DJ. What place does naltrexone have in the treatment of alcoholism? CNS Drugs. 2004; 18:547–560. [PubMed: 15222772]
- Rohsenow DJ, Colby SM, Martin RA, Monti PM. Nicotine and Other Substance Interaction Expectancies questionnaire: Relationship of expectancies to substance use. Addictive Behaviors. 2005; 30:629–641. [PubMed: 15833569]
- Rohsenow DJ, Martin RA, Tidey JW, Monti PM, Colby SM. Comparison of the Cigarette Dependence Scale with four other measures of nicotine involvement: Correlations with smoking history and smoking treatment outcome in smokers with substance use disorders. Addictive Behaviors. 2013 Advance online publication April 2013. doi: 10.1016/j.addbeh.2013.03.019.
- Rohsenow DJ, Monti PM, Colby SM, Gulliver SB, Swift RM, Abrams DB. Naltrexone treatment for alcoholics: Effect on cigarette smoking rates. Nicotine and Tobacco Research. 2003; 5:231–236. [PubMed: 12745496]
- Rohsenow DJ, Monti PM, Colby SM, Martin RA. Brief interventions for smoking cessation in alcoholic smokers. Alcoholism: Clinical and Experimental Research. 2002; 26:1950–1951.
- Rohsenow DJ, Monti PM, Martin RA, Colby SM, Myers MG, Gulliver SB, Abrams DB. Motivational enhancement and coping skills training for cocaine abusers: Effects on substance use outcomes. Addiction. 2004; 99:862–874. [PubMed: 15200582]
- Rohsenow DJ, Monti PM, Martin RA, Michalec E, Abrams DB. Brief coping skills treatment for cocaine abuse: 12-month substance use outcomes. Journal of Consulting and Clinical Psychology. 2000; 68:515–520. [PubMed: 10883569]
- Rosenbaum PR. Sensitivity analysis in observational studies. Encyclopedia of Statistics in Behavioral Science. 2005; 4:1809–1814.
- Rubin, DB. Multiple imputation for nonresponse in surveys. Wiley; New York: 1987.
- SAS/STAT User's Guide: Version 12.3. SAS Institute; Cary, NC: 2013.
- Schafer JL, Graham JW. Missing data: Our view of the state of the art. Psychological Methods. 2002; 7:147–177. [PubMed: 12090408]
- Sees KL, Clark HW. When to begin smoking cessation in substance abusers. Journal of Substance Abuse Treatment. 1993; 10:189–195. [PubMed: 8510193]
- Seidner AL, Burling TA, Gaither DE, Thomas RG. Substance-dependent inpatients who accept smoking treatment. Journal of Substance Abuse. 1996; 8:33–44. [PubMed: 8743767]
- Sobell LC, Sobell MB. Can we do without alcohol abusers' self-reports? The Behavior Therapist. 1986; 7:141–146.
- Sobell, LC.; Sobell, MB. Convergent validity: An approach to increasing confidence in treatment outcome conclusions with alcohol and drug abusers.. In: Sobell, LC.; Sobell, MB.; Ward, E., editors. Evaluating alcohol and drug abuse treatment effectiveness: Recent advances. Pergamon Press; Elmsford, NY: 1980. p. 177-183.
- Sobell, MB.; Sobell, LC.; Kozlowski, LT. Dual recoveries from alcohol and smoking problems.. In: Fertig, JB.; Allen, JP., editors. Alcohol and tobacco: From basic science to clinical practice. Research Monograph 30, National Institute on Alcohol Abuse and Alcoholism; 1995. p. 207-224.
- Soria R, Legido A, Escalano C, Yeste AL, Montoya J. A randomised controlled trial of motivational interviewing for smoking cessation. British Journal of General Practice. Oct.2006 :768–774. [PubMed: 17007707]
- Stapleton JA, Keaney F, Sutherland G. Illicit drug use as a predictor of smoking cessation treatment outcome. Nicotine and Tobacco Research. 2009; 11:685–689. [PubMed: 19395684]
- Tsoh JY, Chi FW, Mertens JR, Weisner CM. Stopping smoking during first year of substance use treatment predicted 9-year alcohol and drug treatment outcomes. Drug and Alcohol Dependence. 2011; 114:110–118. [PubMed: 21050681]
- Velicer WF, DiClemente CC, Rossi JS, Prochaska JO. Relapse situations and self-efficacy: An integrative model. Addictive Behaviors. 1990; 15:272–283.

Zacny, JP. Behavioral aspects of alcohol-tobacco interactions.. In: Galanter, M., editor. Recent Developments in Alcoholism: Volume 8. Combined Alcohol and Other Drug Dependence. Plenum Press; New York: 1990. p. 205-219.

Figure 1.
Flow chart of recruitment and retention.

Figure 2.

Percent of participants confirmed abstinent from smoking at each follow-up period by assignment to MI versus BA treatment (top panel) and by booster condition assignment (lower panel). No main or interaction effects are significant; presentation of conditions separately permits easier detection of trends. Standard errors are so small that standard error bars are not visible.

Figure 3.

Percent of participants confirmed abstinent from smoking at each follow-up period by assignment to MI versus BA treatment and by low versus high pretreatment number of drug use days (dichotomized by median split at 22.5 days). Significant differences are indicated by asterisks. Standard errors are so small that standard error bars are not visible.

Figure 4. Contemplation Ladder scale score (motivation to quit smoking) at pretreatment and 1-month outcome assessments by assignment to MI versus BA treatment (means and standard error bars). Significant differences are indicated by asterisks.

Figure 5.

Percent of participants reporting using nicotine replacement products during the 0-1 and 1-3 month follow-up intervals by booster condition assignment. Significant differences are indicated by asterisks. Standard errors are so small that standard error bars are not visible.

Table 1

Participant Pretreatment Characteristics by Treatment Condition.

Variable	MI No Booster Mean (SD) or %	MI Booster Mean (SD) or %	BA No Booster Mean (SD) or %	BA Booster Mean (SD) or %
Age in years	36.20 (6.21)	35.05 (7.18)	31.71 (6.72)	32.20 (8.13)
Education (years)	12.15 (1.63)	12.60 (2.69)	12.36 (2.54)	11.86 (2.13)
Income yearly	\$15,525.75 (\$16,859.36)	\$20,614.45 (\$27,958.86)	\$17,565.57 (\$23,220.04)	\$17,250.60 (\$20,022.33)
Days in facility	45.93 (19.43)	49.78 (20.93)	42.21 (22.14)	40.12 (19.38)
CO Level	27.70 (10.98)	24.78 (10.68)	23.64 (8.13)	20.02 (9.38)
Cigarettes/day	22.25 (8.62)	20.19 (6.86)	22.99 (8.99)	19.39 (6.80)
FTND	6.50 (1.72)	5.28 (2.11)	6.00 (1.77)	5.19 (2.07)
Years smoke daily	19.72 (6.80)	19.49 (7.34)	16.69 (6.54)	17.26 (9.04)
% drinking days	46.85 (28.08)	43.71 (29.20)	50.41 (31.24)	44.30 (33.13)
% drug use days	28.13 (31.15)	34.13 (34.93)	33.69 (31.64)	31.60 (32.35)
Drinks per day	8.59 (8.18)	9.59 (11.67)	10.52 (10.76)	8.70 (11.43)
Race – white	92.5%	80.0%	83.7%	88.1%
Race – black	7.5%	20%	9.3%	7.1%
Race – other	0%	0%	1%	2.4%
Hispanic	0%	0%	1%	1%
Male	55%	52.5%	59.5%	62.8%
Married or living together	12.5%	17.5%	11.6%	14.3%
Unemployed	77.5%	77.5%	86%	78.6%
Drug use disorder	70%	60%	79.1%	83.3%