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Treating Smokers in Substance Treatment With Contingent Vouchers, Nicotine Replacement and Brief Advice Adapted for Sobriety Settings[☆]

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ABSTRACT

Treatment for substance use disorders (SUD) provides an opportunity to use voucher-based treatment for smoking. Nicotine replacement (NRT) could improve outcomes previously observed with vouchers without NRT. *Methods:* A randomized controlled trial compared contingent vouchers (CV) for smoking abstinence to noncontingent vouchers (NV), when all received counseling and NRT. Smokers who had not sought smoking treatment ($n = 340$) in residential SUD treatment were provided 14 days of vouchers for complete smoking abstinence per exhaled carbon monoxide (CO) after a 5-day smoking reduction period, or vouchers only for breath samples, plus brief advice (four sessions) and 8 weeks of NRT.

Results: Within treatment, 20% had complete abstinence with CV, 5% with NV ($p < .001$), and participants showed 50% of days abstinent in CV compared to 22% in NV ($p < .001$). Across 1, 3, 6 and 12 months after randomization, CV resulted in significantly fewer cigarettes per day ($p < .01$) and fewer days smoking ($p < .01$), but with small effects. Point-prevalence abstinence differences across follow-up (e.g., 4% CV, 2% in NV at 6 and 12 months) were not significant. No differences in substance use were seen.

Conclusions: Within-treatment effects on abstinence are stronger than in a prior study of the same CV with BA but without NRT, but NRT does not improve abstinence after vouchers end. Implications for voucher-based treatment include investigating effects when combined with stronger smoking medications and using motivational interviewing. Smoking treatment does not harm SUD recovery.

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1. Introduction

Smokers with substance use disorders (SUD) smoke at higher rates than in the general population (e.g., Compton, Thomas, Stinson, & Grant, 2007; Moliterno et al., 1994; Roll, Higgins, Steingard, & McGinley, 1998) and have little success in quitting smoking early in recovery with the common first-line smoking treatments (e.g., Bien & Burge, 1991; Joseph, Willenbring, Nugent, & Nelson, 2005; Kalman et al., 2001; Monti, Rohsenow, Colby, & Abrams, 1995; Prochaska, Delucchi, & Hall, 2004). SUD treatment provides an opportunity to provide smoking treatments to smokers with SUD, but stronger approaches may be needed to encourage these smokers to attempt to quit smoking and to sustain abstinence. In this population, motivation to quit smoking is low (Flach & Diener, 2004; Martin, Rohsenow, MacKinnon, Abrams, & Monti, 2006; Richter, Gibson, Ahluwalia, & Schmelzle, 2001; Rohsenow, Martin,

Tidey, Monti, & Colby, 2013) and correlates with perceiving more barriers to quitting (Martin et al., 2006). Smokers in SUD treatment indicated that tobacco abstinence effects are major barriers to attempting smoking cessation (Asher et al., 2003; Martin, Cassidy, Murphy, & Rohsenow, 2016). Expecting to be unable to tolerate the discomforts of tobacco abstinence predicts less tobacco abstinence for smokers with SUD 3 months later (Rohsenow, Tidey, Kahler, et al., 2015). Therefore, medication to reduce the discomfort of abstinence plus additional incentives to undergo smoking abstinence may be needed for these smokers to even attempt to quit smoking.

Clinical practice guidelines (USDHHS, 2000) suggest providing smokers with behavioral counseling and at least nicotine replacement therapy (NRT). NRT plus counseling results in only an average of 3.5% point-prevalence abstinence at 12 months with currently sober people with a history of alcohol use disorders (AUDs) (per Hughes, 1993; Hurt et al., 1995), and there are few or no data for smokers with mixed SUDs. However, combining NRT and counseling with a stronger method to incentivize initial abstinence is warranted to determine if this would improve initial and sustained smoking abstinence.

Contingent vouchers (CV) to incentivize smoking abstinence on a platform of brief counseling can encourage initial abstinence in

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unmotivated smokers and provide a foundation for longer term abstinence (Sigmon & Patrick, 2012). Published studies of CV for smoking abstinence among smokers with SUD, mostly with smokers receiving pharmacologic treatment for opiate dependence, showed that CV significantly increased smoking abstinence compared to noncontingent incentives (NV) while the incentives were in place, but not for long after incentives were terminated (Alessi & Petry, 2014; Alessi, Petry, & Urso, 2008; Dunn, Sigmon, Thomas, Heil, & Higgins, 2008; Dunn et al., 2010; Hunt, Rash, Burke, & Parker, 2010; Robles et al., 2005; Shoptaw, Jarvik, Ling, & Rawson, 1996; Shoptaw et al., 2002; Wiseman, Williams, & McMillen, 2005). Most of these studies involved limited or no counseling. One study of smokers in SUD treatment compared CV to NV on a platform of four sessions of brief advice (BA; Manley, Epps, Husten, Glynn, & Shopland, 1991) or Motivational Interviewing (MI; Miller & Rollnick, 1991, 2002) adapted to concerns of smokers with SUD but without adjunctive pharmacotherapy (Rohsenow, Tidey, Martin, et al., 2015). CV resulted in significantly more smoking abstinence within-treatment (25% of days in CV, 5% of days in NV), and over 12 months when combined with MI (6.6% of participants abstinent) rather than BA (0% of participants abstinent). However, long-term point-prevalence abstinence rates were still low, suggesting that adding pharmacotherapy such as NRT might improve the outcomes for CV.

In this study, smokers who had not sought smoking treatment in a residential SUD treatment program were randomized to the same CV as in Rohsenow, Tidey, Martin, et al. (2015): 14 days of vouchers for smoking abstinence (based on carbon monoxide (CO) readings twice a day) after a 5-day smoking reduction period, or to the same NV: vouchers not contingent on smoking status. All received BA, a standard of care for smokers not seeking smoking treatment (USDHHS, 2000), and up to 8 weeks of NRT. When this study was started, the results of Rohsenow, Tidey, Martin, et al., 2015, showing that CV was more effective when combined with MI than BA were not available. Therefore, BA adapted for sobriety concerns was chosen since without CV, BA was equivalently effective to MI with smokers in SUD treatment (Rohsenow et al., 2014). Effects on smoking abstinence were investigated both within-treatment and over a year of follow-up. Effects on any substance use were also investigated to ensure no harmful effects, consistent with most smoking treatment studies in this population (reviewed in Rohsenow, 2015).

2. Materials and methods

2.1. Participants

2.1.1. Site

The clinical sites were two inner-city state-funded residential SUD treatment program (Gateway Healthcare, Inc., and The Providence Center). The abstinence-oriented programs provided SUD education in a group format based on 12-step models, with outpatient aftercare available. Smoking cessation was not addressed by the programs and patients were able to smoke outdoors. The sites differed primarily in lengths of stay (see the Results section). At the outset of the study, we provided in-service training with staff to address the benefits of smoking cessation for people engaged in SUD treatment. Since we had conducted other smoking treatment research there previously, clinical staff posed no barriers.

2.1.2. Eligibility criteria

Participants ($n = 363$) were recruited from patients on site by a member of the research staff, generally in the first week after admission to the SUD treatment program and after any detoxification was completed. Eligibility criteria included meeting current DSM-IV SUD criteria (see Section 2.4.2) and smoking at least 10 cigarettes per day for the past 6 months. Patients were excluded if they were engaged in smoking treatment; hallucinating or delusional; could not read; or met the exclusionary criteria for transdermal NRT (pregnant or nursing; treatment in the last 3 months for unstable angina, severe congestive heart failure,

uncontrolled hypertension; lung cancer; supplemental oxygen; history of adverse reactions to NRT; allergies to adhesive; any severe skin disease that requires treatment). Recruits were told that the study would provide informational sessions about smoking without requiring cessation, would provide free NRT for 8 weeks, and would offer payments either for reduced smoking followed by abstinence, or just for providing breath samples for 19 days.

2.2. Overview of procedures

The design was a 2-group (CV vs. NV) randomized controlled clinical trial (RCT). Urn randomization (Stout, Wirtz, Carbonari, & Boca, 1994) on the first day of the voucher period stratified by gender, Fagerström Test for Nicotine Dependence (FTND; Heatherton, Kozlowski, Frecker, & Fagerström, 1991), and Smoking Contemplation Ladder (CL; Biener & Abrams, 1991) scores. The median splits for FTND and the CL were based on medians from a previous study with similar participants. Follow-ups were at 1, 3, 6 and 12 months. To maximize follow-up rates, we collected detailed contact information, the costs of transportation were covered, reminders were sent, and participants consented to designate a significant other as a locator. All procedures received IRB approval from Brown University and the clinical sites, and we had a federal Certificate of Confidentiality.

2.3. Interventions

2.3.1. NRT

NRT was provided to all for 8 weeks at no charge starting the day before the voucher period started. NRT followed clinical practice guidelines (USDHHS, 2000): 21 mg/day for 4 weeks, 14 mg/day for 2 weeks, and 7 mg/day for 2 weeks, with a written instruction sheet provided and reviewed. Because this study was designed to motivate people who had not sought smoking cessation (in addition to assisting with cessation for those who want to quit), we could not require patients to use NRT but we asked everyone to try it (consistent with clinical guidelines for motivating smoking cessation, Fiore et al., 2000).

2.3.2. Brief advice

Fully manualized BA was provided to all in four sessions: the day before starting the voucher period and 7, 14 and 19 days later. BA used recommended methods (Hollis, Lichenstein, Vogt, Stevens, & Biglan, 1993; Manley et al., 1991), adapted for SUD recovery issues. In the initial session (15 min), therapists assessed interest in quitting, directly advised patients to stop smoking now for their health, assisted by giving advice about useful methods, and asked them to set a quit date within the next week. A handout on common barriers to smoking cessation was provided and corrective information about each was reviewed, especially to correct concerns about effects on sobriety. A handout of cognitive-behavioral coping skills was reviewed together. Patients were given a consumer guide for smoking cessation (Strecher, Rimer, & Monaco, 1989), were encouraged to select from a variety of nationally available published pamphlets on smoking cessation (e.g., effects on pregnancy, children, smoking and food, handling withdrawal, etc.), and were given hard candy on request (chewing gum not allowed on site). In additional sessions (10–15 min each), our counselor checked on progress toward smoking cessation, reviewed their CO record, reminded them of health reasons for quitting, engaged in problem-solving around barriers, noted successes and methods they should continue using, and reminded them of methods available. The last session discussed coping with the transition off of the contingencies.

Interventions were provided by two masters' level and one bachelor's level research therapists after 10 h of training with the treatment manual, including training in being empathic, nonargumentative, and supporting self-efficacy. Treatment session audiotapes (33% of initial sessions, 25% of additional sessions) were reviewed in weekly group supervision with a psychologist trained in the approach, and

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