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Short Communication

Small financial incentives increase smoking cessation in homeless smokers: A pilot study

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HIGHLIGHTS

- Small financial incentives for smoking cessation in homeless smokers were examined.
- Compared to usual care, incentives increased biologically verified abstinence.
- This adjunctive treatment may increase cessation success in homeless smokers.

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ABSTRACT

Although over 70% of homeless individuals smoke, few studies have examined the effectiveness of smoking cessation interventions in this vulnerable population. The purpose of this pilot study was to compare the effectiveness of shelter-based smoking cessation clinic usual care (UC) to an adjunctive contingency management (CM) treatment that offered UC plus small financial incentives for smoking abstinence. Sixty-eight homeless individuals in Dallas, Texas (recruited in 2012) were assigned to UC ($n = 58$) or UC plus financial incentives (CM; $n = 10$) groups and were followed for 5 consecutive weeks (1 week pre-quit through 4 weeks post-quit). A generalized linear mixed model regression analysis was conducted to compare biochemically-verified abstinence rates between groups. An additional model examined the interaction between time and treatment group. The participants were primarily male (61.8%) and African American (58.8%), and were 49 years of age on average. There was a significant effect of treatment group on abstinence overall, and effects varied over time. Follow-up logistic regression analyses indicated that CM participants were significantly more likely than UC participants to be abstinent on the quit date (50% vs. 19% abstinent) and at 4 weeks post-quit (30% vs. 1.7% abstinent). Offering small financial incentives for smoking abstinence may be an effective way to facilitate smoking cessation in homeless individuals.

1. Introduction

Although the prevalence of smoking has declined to 19.3% among U.S. adults, over 70% of homeless individuals currently smoke (Baggett & Rigotti, 2010; Centers for Disease Control and Prevention, 2012; Lee et al., 2005; Sachs-Ericsson, Wise, Debrody, & Paniucki, 1999). The high smoking prevalence among homeless individuals is a major contributor to their higher rates of disease, shorter life expectancies, and high health care costs (Arnsten, Reid, Bierer, & Rigotti, 2004; Butler et al., 2002; Hwang & Henderson, 2010; Hwang et al., 2009). Unfortunately, very little is known about smoking cessation in this population (Okuyemi, Thomas, et al., 2006). Research has indicated that over 70% of homeless smokers plan to make a cessation attempt within the next six months (Butler et al., 2002; Okuyemi, Caldwell, et al., 2006) and have similar numbers of cessation attempts compared to the general population of smokers (Butler et al., 2002). However, only a handful of studies have evaluated the efficacy of smoking cessation interventions in homeless smokers (Bonevski, Baker, Twyman, Paul, & Bryant, 2012; Okuyemi et al., 2013; Shelley et al., 2010; Spector, Alpert, & Karam-Hage, 2007). Most of these studies had very small samples (i.e., 10 to 58 participants) and abstinence rates were low. The most recent and largest study examining smoking cessation in homeless smokers

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compared 6-sessions of motivational interviewing to a brief cessation advice condition (Okuyemi et al., 2013). All participants received 8 weeks of nicotine replacement therapy. Abstinence rates at the 6 month follow-up visit were not significantly different between groups (9.3% vs. 5.6%). More research is needed to develop effective smoking cessation interventions for homeless smokers.

Many studies have demonstrated that the tangible reinforcement (e.g., money, prizes) of abstinence (i.e., contingency management [CM]) increases smoking cessation rates (Dunn et al., 2010; Heil et al., 2008; Tevyaw et al., 2009; Volpp et al., 2006, 2009). However, studies have yet to evaluate the CM approach for smoking cessation among the homeless. Plausibly, the CM approach would hold particular appeal for homeless individuals who possess few monetary resources. The primary objective of this pilot study was to compare the outcomes of usual shelter-based smoking cessation clinic care (i.e., support groups + cessation medication) to an adjunctive contingency management intervention that reinforced biochemically-verified abstinence with low-value gift cards.

2. Methods

2.1. Sample and procedure

Participants were recruited from a homeless shelter in Texas. Individuals were eligible to participate if they were ≥18 years of age, had >6th grade reading level (assessed via the Rapid Estimate of Adult Literacy in Medicine; Davis et al., 1991), smoked ≥5 cigarettes per day, had a carbon monoxide level ≥8 parts per million (ppm) at baseline, and were able to attend 6 weekly assessment sessions (i.e., baseline [1 week pre-quit], quit date, and weeks 1, 2, 3, and 4 post-quit). Enrollment in the shelter-based smoking cessation program and residence in the transitional shelter were required for study participation.

Smokers interested in quitting were referred to the shelter-based smoking cessation program by shelter staff. Individuals who attended the orientation visit for the smoking cessation program were provided with detailed information about the current study and were given the opportunity to ask questions prior to enrollment. Informed consent was obtained from all interested individuals.

2.2. Interventions

Participants who enrolled in the study from January 11, 2012 through October 17, 2012 were assigned to the Usual Care group, and those who enrolled between October 18, 2012 and November 7, 2012 were assigned to the Usual Care + Contingency Management group (CM). Usual Tobacco Clinic Care (UC) at the shelter is consistent with the recommendations of the Clinical Practice Guideline (Fiore et al., 2008) and included weekly smoking cessation therapy/support groups (approximately 45 min each) and access to smoking cessation medications when prescribed by the on-site physician.

CM participants had the opportunity to earn a $20 gift card for biochemically-verified abstinence on the quit date. An escalating reinforcement schedule was used to encourage continuous abstinence (Roll et al., 2006), such that the amount of gift card payments increased by $5 with each consecutive week of abstinence (i.e., up to $40 at 4 weeks post-quit). Non-abstinent participants were able to earn incentives at the next visit if abstinence criteria were met, but the gift card payment was reset to the starting level (i.e., $20). Contingent financial incentives were distributed during assessment visits.

2.3. Assessments

The participants were compensated for completing 4 of the 6 study assessment visits (i.e., baseline, quit date, week 1 post-quit, and week 4 post-quit). Participants were not paid for completing the brief (i.e., 5 min) week 2 and week 3 post-quit assessment visits. Demographic (e.g., age, gender, race/ethnicity), smoking (e.g., years of smoking, cigarettes smoked per day, heaviness of smoking index; Borland, Yong, O'Connor, Hyland, & Thompson, 2010), and homelessness characteristics were assessed at the baseline visit (see Table 1).

2.4. Abstinence

All the participants were instructed to quit smoking by 10:00 p.m. on the night before their quit date visit. Thus, abstinent participants had a minimum of 13 h of smoking abstinence when assessed during the quit date visit. On the quit date, participants were considered abstinent if they self-reported abstinence from smoking (not even a puff) since 10:00 p.m. the evening prior and had an expired carbon monoxide level of <10 ppm. On weeks 1, 2, 3, and 4 post-quit, the participants were considered abstinent if they self-reported abstinence from smoking (not even a puff) during the previous 7 days and had an expired carbon monoxide levels of <8 ppm. Those who did not attend a visit were considered non-abstinent at that visit.

2.5. Statistical analyses

Analysis of variance (ANOVA) and x^2 tests were used to identify baseline differences between the treatment groups. Given the dependency of repeated abstinence measurements nested within participants (Singer & Willett, 2003), a generalized linear mixed model (GLMM) regression analysis (McCulloch & Searle, 2001) was used to evaluate the overall impact of treatment on abstinence. An additional GLMM evaluated whether the effect of treatment varied over time (via the addition of a treatment group × time interaction term). Follow-up

Table 1
Baseline participant characteristics.

Variable	Usual Care % or M (SD) (n = 58)	CM % or M (SD) (n = 10)	Total % or M (SD) (N = 68)
Demographic characteristics			
Age*	50.0 (7.7)	44.3 (11.1)	49.2 (8.4)
Male	65.5%	40%	61.8%
Race/ethnicity*			
Black	55.2%	80.0%	58.8%
White	34.5%	0.0%	30.9%
Hispanic	3.4%	10.0%	4.4%
More than 1 race	6.9%	10.0%	10.3%
Married or Partnered	13.8%	10.0%	13.2%
Years of Education	12.5 (2.0)	12.2 (0.6)	12.4 (1.9)
REALM	61.8 (4.9)	62.4 (3.7)	61.9 (4.7)
Family income past year	$1520 ($2856)	$1922 ($2211)	$1577 ($2761)
Uninsured*	87.9%	60.0%	83.8%
Homelessness characteristics			
Age first time homeless	41.1 (12.6)	33.3 (14.1)	40.0 (13.1)
Separate homeless occasions	3.5 (7.1)	3.5 (2.3)	3.5 (6.6)
Lifetime homelessness (months)	37.0 (44.3)	39.0 (26.3)	37.3 (42.0)
Reasons for homelessness (% yes)			
Job Loss	41.1%	50.0%	42.6%
Eviction	34.5%	20%	32.4%
Substance abuse	29.3%	40%	30.9%
Mental illness	36.2%	30%	35.3%
Medical bills	6.9%	0.0%	5.9%
Family problems	39.7%	40%	39.7%
Legal problems	13.8%	0.0%	11.8%
Natural disaster	1.7%	0.0%	1.5%
Other	20.7%	30.0%	22.1%
Smoking characteristics			
Cigarettes per day	18.1 (10.6)	15.5 (5.1)	17.7 (10.0)
Years smoking	29.3 (10.6)	29.9 (12.6)	29.4 (10.8)
Lifetime quit attempts ≥24 h	4.2 (3.3)	2.7 (1.6)	4.0 (3.1)
Smoke menthol cigarettes (% yes)	51.7%	80.0%	55.9%
Heaviness of Smoking Index	2.9 (1.4)	3.3 (1.5)	3.0 (1.5)

REALM: Rapid Estimate of Adult Literacy in Medicine; CM: Contingency Management.
* ANOVA or chi square analyses indicated significant group differences at the $p < .05$ level.