Original investigation

Outcomes of a Tailored Intervention for Cigarette Smoking Cessation Among Latinos Living With HIV/AIDS

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Abstract

Introduction: Tobacco use has emerged as a leading killer among persons living with HIV, with effective approaches to tobacco treatment still unknown. HIV infection is nearly 3 times as prevalent in Latinos than in non-Latino Whites. This study reports the results of a randomized trial comparing a tailored intervention to brief counseling for smoking cessation among Latino smokers living with HIV (LSLWH).

Methods: LSLWH ($N = 302$; 36% female, 10% employed full-time, 49% born in United States) were randomized to 4 in-person sessions of a tailored intervention (Aurora) or 2 in-person sessions of brief advice (enhanced standard care [ESC]). Both groups received 8 weeks of nicotine replacement therapy (NRT) patch. Biochemically validated 6- and 12-month 7-day point-prevalence abstinence (PPA) rates were compared, along with secondary outcomes (e.g., reduction to light smoking, NRT adherence).

Results: Seven-day PPA rates reached 8% versus 11% at 6 months and 6% versus 7% at 12 months, for Aurora and ESC, respectively, with no between-group differences (p values $> .40$). Significant changes from baseline to 6 and 12 months among intervention targets were noted (percentage reduction in heavy smoking and dependence; increases in knowledge and self-efficacy). Baseline smoking frequency, older age, and higher intensity of patch use during the trial emerged as significant predictors of abstinence at 6 months.

Conclusions: There was no evidence that the tailored intervention improved cessation rates. Interventions that encourage use of, and adherence to, empirically validated cessation aids require further development to reduce tobacco-related death and disease in this vulnerable population.

Introduction

Tobacco use is a leading cause of death in persons living with HIV (PLWH). Improved survival resulting from highly active

antiretroviral therapy is tempered by alarming increases in non-AIDS related malignancies,^{1–3} most notably lung cancer.^{2,3} Smoking is associated with a range of morbidities in PLWH, including increased risk

of various cancers, chronic obstructive pulmonary disease, bacterial and pneumococcal pneumonia, tuberculosis, and numerous opportunistic infections.⁴⁻⁸ Of the more than 1.1 million PLWH in the United States, two-thirds are current smokers, 75% are interested in quitting, but almost none access smoking cessation interventions designed to meet their specific needs and concerns.⁹⁻¹²

Hispanics/Latinos represent 16% of the population, but account for approximately 21% of all new HIV and AIDS cases, a rate 2.8 times that of non-Hispanic Whites.¹³ Although Latino smoking rates are lower than national averages (12.4% vs. 19.2%), rates among heterogeneous subgroups differ by nativity; for example Puerto Ricans are more likely to be current smokers (16.9%) than Central or South Americans (7.2%) and Mexicans (12.0%).¹⁴ Interestingly, despite Latinos generally being “lighter” smokers than non-Latino Whites, they are not necessarily more successful at quitting.¹⁵ Poor abstinence rates among underserved groups, such as ethnic minorities and PLWH, may reflect limited referral to and/or use of effective smoking cessation treatments, differential outcomes when participating in recommended treatments, or higher rates of smoking relapse following periods of abstinence compared to the general population.¹⁶⁻¹⁹

Despite high levels of interest in quitting,¹¹ only a small proportion of PLWH smokers who participate in clinical trials that include nicotine replacement therapy (NRT) sustain abstinence at 6 months,²⁰ compared to 20%–30% quit rates seen with similar treatments in the general population of smokers.²¹ To date, only two adequately powered smoking cessation trials have been conducted with PLWH smokers, and abstinence outcomes at 6 months have not exceeded 12%.^{20,22} An exception is a recent 3-arm study comparing intensive individual counseling, static web-based tobacco treatment, and a minimal contact control that reported high 3-month quit rates in all three conditions (26%, 29%, and 24%, respectively) with no significant between-group differences.²³ A cellphone-based individual counseling intervention for PLWH smokers has reported promising 3-month cessation rates compared with standard care, but these gains were not maintained at 6 or 12 months.²⁰ Finally, a motivational intervention failed to demonstrate improved 6-month cessation rates compared with standard care with free NRT.²²

Smokers living with HIV are a unique population with significant comorbidities that place them at greater risk of relapse, including illicit drug use, high prevalence of psychiatric comorbidity, limited socioeconomic resources, misinformation about the health risks of smoking in PLWH, and diminished access to care.^{9,11,12,24,25} In a previous smoking cessation trial with PLWH, Latinos had better outcomes, particularly in an enhanced standard care condition, compared to Blacks, Whites, and Others.²³ Based on these findings, it was hypothesized that a more effective tailored standard care intervention for Latino smokers living with HIV (Project “Aurora”) could be developed to address the unique needs of this population. Project Aurora was tailored at multiple levels: (a) individually tailored (based on each participant’s level of addiction, comorbidities, and stressors), (b) culturally tailored (based on Latino background—specifically hiring bilingual Latino staff, incorporating role of culture, family and values related to their country of origin into sessions, translated materials with pictures and videos of people who are of Hispanic background), and (c) HIV referent (specific health consequences of smoking when one is living with HIV, discrimination and stressors related to HIV and its management, burden on family and how that impacts social support). This intervention was then tested in a randomized clinical trial to compare Aurora (4 in-person sessions and 8 weeks of NRT patch) to a non-tailored enhanced standard care condition (ESC; 2 sessions of brief advice and 8 weeks of patch). It was hypothesized that Aurora would yield higher 6- and 12-month

7-day point-prevalence abstinence (PPA) rates compared with the non-tailored ESC intervention. Secondary outcomes included 24-hr PPA, smoking intensity, number of quit attempts, longest period of abstinence, as well as changes in nicotine dependence, motivation to quit, knowledge of health effects and self-efficacy to quit.

Methods

Participants

Participants were required to meet the following inclusion criteria: (a) 18 years or older; (b) HIV seropositive; (c) self-identify as Latino or Hispanic; (d) a current smoker, defined as having smoked cigarettes in the past 7 days; and (e) referred by a participating study physician. Exclusion criteria were: (a) already receiving medications and/or counseling to help quit smoking; (b) contraindication to nicotine patch use; and (c) pregnancy. Study participants received \$10 for their time and travel for each of the four in-person sessions and \$20 for completing each of the three follow-up interviews. Project Aurora participants could invite a social support person to attend intervention sessions with \$10 per session to offset time/travel.

Procedures

The study was performed in nine immunology clinics in the Northeastern United States, between 2006 and 2011. Physicians attended a training workshop based on the National Cancer Institute (NCI) model and Agency for Health Care Policy and Research (AHCPR) Clinical Practice Guideline for brief physician counseling.²⁶ Physicians gave patients standard care brief advice and referred eligible patients to a research assistant who screened participants, administered informed consent and baseline assessments, and randomized participants into one of two treatment conditions, stratified by gender. Patients completed assessments at 6 and 12 months post-baseline. Research staff spoke fluent Spanish and English, the majority of whom were from Hispanic backgrounds. Ten health educators (HE) over the course of the trial delivered the interventions in the nine clinics. HEs were at least Masters level professionals (or had equivalent years of clinical research experience) and were trained on the implementation of the manual driven interventions through role playing the scripts and shadowed supervision during initial participants. Each HE handled an approximately equal number of subjects from each arm, and cross-contamination was guarded against through session checklists and audio tapes that were monitored by supervisors to reduce drift during implementation and later evaluated for fidelity by independent coders. The study protocol was approved by the institutional review boards of Butler Hospital (prime) and participating hospitals.

Intervention Arms

ESC

Participants in ESC attended two in-person sessions, and received one phone call on their quit date. After completing the baseline assessment (week 1), participants met with a HE who provided self-help print materials for quitting smoking. One week later (week 2) the HE assisted in setting a quit date and, if set, the participant received 8 weeks of nicotine patch (Nicoderm CQ; standard dose based on current smoking level). If a quit date was set, the HE called that day to provide support. This intervention exceeded Public Health Service (PHS) Guidelines for smoking cessation, but included no tailored or HIV referent content or materials. The patch was provided free to all participants in both conditions and participants who decided

they were not yet ready to quit in either condition were encouraged to contact the HE any time within the following 6 months to receive patches.

Project Aurora

In light of previous empirical findings that Latinos living with HIV had better smoking cessation outcomes in a behavioral based standard care cessation intervention compared to other participants²² and given the powerful influence Latino culture plays in shaping the norms, attitudes, and health beliefs associated with smoking behaviors,^{27–30} we applied the theory of reasoned action^{31,32} to tailor the intervention for Latino smokers living with HIV (LSLWH). The theory of reasoned action states that behaviors can be understood as the outcome of rational processes in which the individual weighs the costs and benefits of an action. Intention to behave is then predicted by the attitude toward a behavior and/or the perception that important others are supportive of that particular behavior. Latino culture is often described as collectivist and many Latinos have a strong orientation toward family (“familialism”) and emphasis on respect for social relationships (“*simpatía*”).^{33,34} These cultural values express themselves in the beliefs Latinos hold about the consequences of smoking and their motivations to quit.³⁵ Project Aurora incorporated tailored messages into each session to provide an individually relevant message and to encourage positive social relationships that support cessation (e.g., bring a social support buddy to sessions). To avoid “ethnic glossing,”^{36,37} or a lack of appreciation of the heterogeneity within ethnic groups, attention was given to not only using culturally sensitive materials but individually tailoring the counseling content and the quit plan developed in the sessions to each person’s cultural characteristics, values, and patterns.³⁷

The empirically and theoretically driven intervention, Project Aurora, was further developed with input from HIV specialists, behavioral psychologists, tobacco specialists, clinic community advisory boards, and qualitative data from 6 mixed-gender bilingual focus groups. Participants in Aurora received all ESC components (including the same NRT protocol) in addition to (a) culturally sensitive print materials and videos, tailored behavioral counseling, (b) 2 additional in-person sessions focused on tailored relapse prevention, (c) two 10-min booster phone calls, and (d) the option to bring a social support buddy to attend all sessions.

All materials and interventions were available in English and Spanish. Booklets provided to ESC participants,³⁸ although available in both languages, were originally developed in English for non-Latinos (without any specific Latino cultural considerations), and later translated into Spanish. In Aurora tailored materials included handouts developed in our previous research that are targeted for PLWH, as well as a cessation manual (“*guía*”) (NIH Publication No.02-3001) that has been used and tested in Latino populations and is accepted as a culturally appropriate guide for smoking cessation,^{39,40} and has been found to improve quit rates among Latinos.⁴¹ Tailored videos, “*cuentos*” (meaning stories or parables), and follow-up discussions were derived from another Latino targeted smoking cessation program.⁴² All intervention materials, including the *guía* and selected videos, were reviewed with focus groups consisting of Latino PLWH during the development phase of this study.

Measures

Sociodemographic Characteristics

Information was obtained from participants regarding sex, age, race, sexual orientation, highest education, employment, income, nativity

(born in the United States or not), and language preference. The 12-item Brief Acculturation Rating Scale for Mexican Americans-II has been used in studies of Latinos from a variety of backgrounds⁴³ and assesses language, ethnic identity, and ethnic interaction.⁴⁴ A 9-point linear acculturation total score, ranging from –4 (very Latino-Oriented) to +4 (very Anglo-oriented) was used in descriptive and preliminary analyses.⁴⁵ Due to poor reliability (Cronbach’s $\alpha = .50$) it was dropped from analyses.

Smoking Characteristics

Tobacco history was collected at baseline and follow-ups, including current smoking rate; history of tobacco use (cigarettes and cigars), preference for flavoring (menthol vs. regular) and type (full, light, ultra light), and self-rolling of cigarettes. The primary outcome was self-reported 7-day PPA, with missing outcomes coded as continued smoking. Seven-day PPA was verified by exhaled carbon monoxide (CO) <10 parts per million (ppm), (Spirometrics Inc.). In cases of discrepant self-reported abstinence CO measures, participants were considered smokers. The Fagerstrom Test for Nicotine Dependence (FTND)⁴⁶; is a reliable and well-validated 6-item measure of nicotine dependence that was validated in English and Spanish⁴⁷ and is used to classify dependence on a 10-point scale (higher scores indicate greater levels of dependence). The study sample had an observed FTND range of 1 to 10 (Cronbach’s $\alpha = .58$). Daily cigarette consumption (CPD) was used to divide the sample into light (≤ 10 CPD) versus heavy smokers (> 10 CPD), a definition consistent with robust literature.^{48,49} In addition to smoking intensity, we measured smoking frequency in a manner consistent with the definition of Shiffman and colleagues^{50,51}: Daily smokers had to report smoking 28 days or more in the past month, whereas someday smokers had to report smoking ≤ 27 days. The Contemplation Ladder, a continuum of 10 motivation levels, was used to assess participants’ readiness to quit smoking, with higher scores indicating a greater motivation to quit.⁵² The 9-item short-form Situational Temptation Scale was used to assess the degree to which participants felt tempted to smoke in various situations, with higher scores indicating greater temptation (i.e., lower self-efficacy).⁵³ The study sample had a mean score range of 1 to 5 (Cronbach’s $\alpha = .83$). Participants’ knowledge of the health effects of smoking and HIV yielded a percent correct total knowledge score.^{54–56} Patch use was ascertained by participant self-report at follow-up, as well as chart reviews of documented start- and stop-dates of patches dispensed by the HE. An integrated measure of individual patch use was then estimated by weighing NRT dose (mg) by duration of use (weeks).

Process Evaluation and Treatment Fidelity

To examine fidelity to each intervention protocol, independent raters reviewed audiotapes of 20% of the first two sessions (sessions with the lowest attrition rates) and used a fidelity rating form that counted whether each specific intervention element required by the study protocol was addressed. Results revealed adequate treatment fidelity (e.g., 81% and 70% of correct content in session 1 delivered for Aurora and ESC, respectively). Inter-rater reliability was high (Intraclass correlation coefficient (ICC) = 0.93 and 0.81 for sessions 1 and 2). Mean duration of session one was three times as long for Aurora ($M = 61$ min; $SD = 13$, range = 30–78) compared with ESC ($M = 21$ min, $SD = 8$, range = 5–42). Similarly, mean duration of session two differed by condition, and was the highest for Aurora participants who elected to bring a buddy.

Analytic Plan

Frequencies and descriptive statistics summarize socioeconomic, demographic, and smoking-related characteristics (Supplementary Table S1). Univariate analyses were conducted in order to examine differences in these variables by abstinence at 6 and 12 months; significance levels were calculated using tests for categorical variables, and *t* tests for continuous variables. Fisher's tests and Wilcoxon signed rank tests were used as alternatives, where appropriate, for categorical and continuous variables, respectively.

Based on our prior research examining predictors of abstinence in a sample of PLWH,^{22,57} we sought to examine whether presumed intervention effects on 7-day PPA at 6 months were mediated by NRT dose received. Following Baron and Kenny,⁵⁸ we fit logistic regression models for abstinence as a function of treatment assigned, both with and without adjustment for NRT dose received. To sharpen the inferences on the treatment affect, the regression model controlled for baseline sociodemographic and smoking characteristics likely to be related to abstinence. If continuous, such model covariates were centered by their mean in the overall sample ($N = 302$). Per study protocol, analyses were conducted by imputing missing outcomes using a baseline-carry-forward assumption.

Results

A summary of the screening, recruitment, and retention process is shown in Figure 1.

In sum, 302 participants (36% female, mean age = 45, $SD = 8$, 79% heterosexual, 57% less than high school education, 10% employed full-time, 49% born in United States, 56% Puerto Rican descent) were enrolled and randomized (148 to ESC and 154 to Aurora).

With dropouts coded as smokers throughout, 7-day PPA rates reached 8% versus 11% at 6 months and 6% versus 7% at 12 months, for Aurora and ESC, respectively, indicating no between-group differences (both *p* values > .40). Table 1 also documents no significant differences between the intervention groups on secondary tobacco outcomes (e.g., number of quit attempts, longest period of abstinence, nicotine dependence as measured by the FTND).

Table 2 reveals significant changes from baseline to 6 and 12 months for intervention targets, with notable reductions in percentage of heavy smokers and dependence, as well as increases in knowledge of the health effects and reductions in temptations to smoke (improvements in self-efficacy to avoid temptations). These changes were also significant at 12 months.

Bivariate analyses in Supplementary Table S1 examined individual predictors of 7-day PPA at 6 and 12 months post-intervention

Figure 1. Recruitment and Retention of HIV+ Latinos in a 6-Week Smoking Cessation Program with 12-Month Follow-Up Period.

Table 1. Point-Prevalence Abstinence (PPA) Rates^a, Secondary Tobacco Outcomes, and Intervention Targets: Between-Arm Differences at 6 and 12 Months

	6 months			12 months		
	Aurora	ESC	<i>p</i> value ^c	Aurora	ESC	<i>p</i> value ^c
24-hr PPA, <i>N</i> (column %)						
Abstinent	17 (11)	19 (13)	.630	11 (7)	10 (7)	.895
Non-abstinent	137 (89)	129 (87)		143 (93)	138 (93)	
7-day PPA, <i>N</i> (column %)						
Abstinent	13 (8)	16 (11)	.485	10 (6)	10 (7)	.927
Non-abstinent	141 (92)	132 (89)		144 (94)	138 (93)	
Smoking intensity, <i>N</i> (column %)						
Heavy (>10 CPD)	88 (78.6)	72 (84.7)	.275	42 (77.8)	54 (84.4)	.359
Light (≤10 CPD)	24 (21.4)	13 (15.3)		12 (22.2)	10 (15.6)	
24-hr quit attempts ^b , <i>N</i> (column %)						
None	20 (13)	20 (14)	.803	20 (13)	18 (12)	.508
At least one	76 (49)	83 (56)		52 (34)	60 (41)	
Longest period of abstinence in days, mean (<i>SD</i>) ^d	17.7 (23.0)	19.1 (26.7)	.737	33.9 (49.0)	32.0 (46.5)	.833
FTND total score, mean (<i>SD</i>)	3.5 (2.2)	3.2 (2.4)	.418	3.8 (2.3)	3.5 (2.3)	.362
Motivation (“Ladder”), mean (<i>SD</i>)	7.4 (2.2)	7.6 (1.9)	.195	7.4 (2.0)	7.0 (2.7)	.261
Knowledge (general health effects), mean (<i>SD</i>)	58.2 (11.5)	57.5 (12.5)	.655	59.2 (12.1)	56.3 (12.3)	.126
Self-efficacy (smoking temptation), mean (<i>SD</i>)	3.1 (1.0)	3.1 (1.0)	.775	3.1 (1.1)	3.1 (1.1)	.512

Note. CPD = daily cigarette consumption; ESC = enhanced standard care; FTND = Fagerstrom Test for Nicotine Dependence.

^aAbstinence rates calculated with study dropouts coded as smokers.

^bCounts of patients with at least one quit attempt (24-hr periods of abstinence) at any point during study.

^c*p* values based on two-sample *t* tests for continuous variables, and on chi-square tests for categorical variables.

^dCalculated among those reporting at least one 24-hr quit attempt.

Table 2. Change in Intervention Targets From Baseline to 6 and 12 Months in the Full Sample (*N* = 302)

Outcomes	Baseline	6 months	<i>p</i> value ^a	12 months	<i>p</i> value ^a
Nicotine dependence (Fagerstrom), mean (<i>SD</i>)	5.3 (2.3)	3.4 (2.3)	<.001	3.6 (2.3)	<.001
Motivation to quit (“Ladder”), mean (<i>SD</i>)	6.0 (1.6)	7.6 (2.1)	<.001	7.2 (2.4)	<.001
Knowledge (general health effects), mean (<i>SD</i>)	52.3 (15.1)	57.9 (12.0)	<.001	57.7 (12.2)	<.001
Self-efficacy (smoking temptation), mean (<i>SD</i>)	3.8 (0.8)	3.1 (1.0)	<.001	3.1 (1.1)	<.001
Smoking intensity (% heavy smokers)	50	19	<.001	21	<.001

Note. ^a*p* values based on one-sample *t* test for continuous variables, and on McNemar’s test for binary variables.

for the full sample. Age, nativity status, types of cigarettes smoked, and other substance use were significant at 6 months alone. Baseline smoking frequency, patch use prior to this trial, and duration of patch use during the trial were significant predictors of abstinence at both 6- and 12-month follow-ups.

Finally, Table 3 shows multivariate logistic regression models for 7-day PPA at 6 months. Model A controls for treatment assignment, but not NRT dose received. Results suggest that abstinence rates increased with age ($p = .01$), and were also higher among participants who expressed a preference for Spanish over English ($p = .037$), and who characterized themselves as less-than-daily smokers at baseline ($p = .004$). No significant intervention effects on abstinence were seen in this model ($p = .762$). Model B additionally controlled for NRT dose received (measured in multiples of 7 mg patches administered daily for a full week, i.e., in multiples of 49 mg). Modeled in the square root scale, higher NRT dose received was associated with higher abstinence rates ($p = .014$), but the intervention continued to show no effects on abstinence outcome ($p = .506$).

Given the importance of patch use as a predictor of abstinence, we note that only 75% of participants are known to have received the patch ($N = 228$). Of these, 81% reported trying it at least once ($N = 184$). However, poor adherence was common with 37% of

patch users reporting that they stopped wearing it before the intervention ended ($N = 68$). Main reasons for discontinuation were side effects (25%) and stress or relapse (38%).⁵⁹

Discussion

Smoking abstinence rates at 6 and 12 months did not differ in a cohort of LSLWH when comparing a more intense, tailored multi-session counseling intervention to a shorter standard cessation intervention. Quit rates in both conditions were low, but consistent with the two previous randomized trials to-date with PLWH in which 6-month or longer outcomes yielded quit rates that ranged from 4% to 10% using different intervention approaches such as cell-phone counseling²⁰ and motivational interviewing.^{20,22} Despite theoretical support and previous literature in the general population suggesting that tailored-counseling would yield better outcomes^{17,60-63} and that tailored videos and materials would better engage participants,^{64,65} Aurora did not prove to have added benefit beyond that conferred by the ESC condition. Aurora consisted of significantly longer sessions and a greater number of in-person visits and calls, yet the increased intensity did not translate into better cessation outcomes in this study. The buddy component of the program was

Table 3. Logistic Regression Model for 7-day Point-Prevalence Abstinence (PPA) at 6 Months

Covariate	Model A				Model B			
	OR	LCL	UCL	<i>p</i> value	OR	LCL	UCL	<i>p</i> value
Intercept	0.21	0.08	0.56	.002	0.22	0.07	0.66	.007
Age	1.07	1.01	1.13	.015	1.08	1.02	1.15	.009
Spanish-speaker	2.42	1.06	5.52	.037	2.34	0.95	5.79	.066
Daily smoker	0.24	0.09	0.63	.004	0.23	0.08	0.66	.006
Intervention	0.88	0.40	1.97	.762	0.74	0.31	1.79	.506
Square root (NRT dose)	—	—	—	—	1.45	1.08	1.96	.014

Note. NRT = nicotine replacement therapy; OR = odds ratio; LCL = 95% lower confidence limit; UCL = 95% upper confidence limit. Age (in years) and square root of NRT dose (in multiples of 7 mg × 7 days) have been centered at sample mean.

similarly unsuccessful. While 60% of Aurora participants identified a buddy they wanted to join the program in the first session, only 18% brought someone to the next session. These findings suggest that alternative avenues of tobacco treatment need to be explored.

As reported in previous studies,^{20,25} use of NRT was a critical predictor of abstinence in this trial. The longer a participant wore the nicotine patch, the more likely he/she was able to achieve and maintain abstinence. Although Aurora had specific tailored protocols for enhancing knowledge, perceptions and adherence to the patch, patch-use across conditions was relatively low, and adherence was quite poor. Based on the finding of no difference between intervention groups, one may conclude that the intervention had no overall effect on abstinence rates. However, NRT use emerged as an independent predictor of abstinence, with a 45% increase in the odds of abstinence at 6 months, as the total dose received (mg × duration) during the study period was increased from 198 mg to 444 mg. This finding provides evidence that recommendations drawn from general populations⁵⁹ that NRT forms an integral component of effective smoking cessation programs also apply to PLWH.

In the general population, there are few adequately powered full scale clinical trials of smoking cessation interventions that have demonstrated cultural tailoring improved abstinence rates beyond the other aspects of the intervention.⁶⁶ For example, a cessation trial⁶⁷ reported no additional benefit to culturally tailored intervention materials compared to non-tailored materials among Blacks using NRT. Given findings in this sample and other samples of PLWH,⁵⁷ interventions that specifically target adherence to NRT or pharmacotherapy may be critical to yield better cessation rates. Moreover, the use of novel technologies as adjuncts to care provided in clinics may have promise to maintain engagement that will result in better cessation outcomes.⁶⁸

Approximately 10% of the sample demonstrated 7-day intent-to-treat abstinence at 6 months, which is comparable to other trials.^{20,22} It is important to note, though, that a significant proportion of heavy smokers at baseline reduced their smoking to less than 10 cigarettes per day, becoming light smokers by 6 months, and maintaining these gains at 12 months (Table 2). Although no level of smoking is considered safe, there may be important health benefits to short-term cigarette reduction, even of just 8-weeks duration, including clinically significant improvements in cardiovascular risk factors.⁶⁹ Long-term smoking reduction is also associated with lower risk of lung cancer and cardiovascular disease.^{70–72} In the general population smoking reduction was shown in one study to increase the chances of eventual successful cessation, with smokers who reduced more than 50% from baseline being 1.7 times more likely to quit smoking compared to those who did not reduce.⁷³ There are

no studies to-date that report short or long-term health benefits of reduced cigarette consumption specific to PLWH. While complete abstinence would be preferable, smoking reduction may be a more attainable goal for many PLWH.

Older age, a baseline non-daily smoking profile, and a preference for Spanish over English emerged as predictors of successful quitting at 6-months, with the strength of their relationship to smoking outcome affected little by additional control for differences in patch use. Consistent with growing literature in this area in the general populations,^{51,74,75} there may be clinically meaningful reasons to examine daily versus non-daily smoking, and to identify different treatment approaches that can more effectively address withdrawal symptoms and biopsychosocial reasons for smoking among different profiles of smokers. Moreover, participants who expressed a preference for Spanish over English had odds of 6-month abstinence more than twice as high as those of more-acculturated Latinos, possibly due to lower levels of nicotine dependence.

Certain limitations of the study require mention. The two conditions were not matched evenly by contact; however, this is unlikely to have confounded results, as no significant intervention effects were found. The control condition exceeded usual standard care, and the enhancement may have attenuated the study's ability to detect an effect of the Aurora intervention. Measures of NRT adherence were based on clinical notes and participant self-report. Given NRT adherence emerged an important predictor of outcome, objective measures of adherence to NRT would be preferable in future work. Despite the fact that participants had the option of bringing a social support buddy, few participants actually elected to do so; thus, the sample size was inadequate to examine differences between those who did bring in a support person versus those who did not. Further, subsamples of sessions were evaluated along basic levels of fidelity to respective protocols, however the content of the intervention sessions differed widely due to the nature of individual tailoring and precise measures of fidelity were difficult to operationalize. Finally, participants were recruited from immunology clinics located in the Northeast alone, not permitting for exploration of regional differences in smoking outcomes and reflecting a unique population referred by health care providers. Motivation to quit and compliance with cessation aids may differ in community samples.

In sum, this randomized trial provides evidence that 6%–7% of Latinos living with HIV in this clinical sample were able to quit and remain smoke-free for up to 12 months. Moreover, a significant proportion of participants were able to reduce their cigarette consumption to become light smokers at both 6- and 12-month time points. There was no evidence that the individually-, culturally-, and HIV-tailored intervention improved cessation rates over enhanced

standard care. Adherence to NRT was suboptimal, but, consistent with our prior work, NRT use predicted abstinence. Given the importance of smoking cessation in the management of HIV, future research is needed to develop more effective ways of reaching and motivating smokers living with HIV to engage in interventions that encourage use of, and adherence to, empirically validated cessation aids.

Supplementary Material

Supplementary Table S1 can be found online at <http://www.ntr.oxfordjournals.org>

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Declaration of Interests

None declared.

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