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A Randomized Trial of a Multicomponent Cessation Strategy for Emergency Department Smokers

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Abstract

Objectives—To determine the efficacy of an emergency department (ED)-based smoking cessation intervention.

Methods—A randomized trial conducted from January 2006 to September 2007 at an urban ED that treats 90,000 adults per year. Discharged adults who smoked at least 10 cigarettes per day were randomized to 1) Usual Care, receiving a smoking cessation brochure, or 2) Enhanced Care, receiving the brochure, a motivational interview, nicotine patches, and a phone call at three days. Interventions were performed by a peer educator trained in tobacco treatment. Blinded follow-up was performed at three months.

Results—Three hundred thirty-eight subjects were enrolled, mean age 40.2 years (SD ± 12.0 years), 51.8% were female, and 56.5% were either self-pay or Medicaid. Demographic and clinical variables were comparable between groups. Enhanced and Usual Care arms showed similar cessation rates at three months (14.7% vs. 13.2%, respectively). The proportion of subjects making a quit attempt (69.2% vs. 66.5%), and decrease in daily cigarette use (5 vs. 1) (all $p > 0.05$) were also similar. In logistic modeling, factors associated with quitting included any tobacco-related ICD9 code for the ED visit (OR 3.42, 95% CI = 1.61 to 7.26), or subject belief that the ED visit was tobacco-related (OR 2.47, 95% CI = 1.17 to 5.21). Conversely, subjects who reported having a pre-existing tobacco-related illness were less likely to quit (OR 0.22, 95% CI = 0.10 to 0.50).

Conclusions—The primary endpoint was negative, reflecting a higher-than-expected quit rate in the control group. Subjects whose ED visit was tobacco-related, based either on physician diagnosis or subject perception, were more than twice as likely to quit. These data suggest that even low-intensity screening and referral may prompt substantial numbers of ED smokers to quit or attempt to quit.

INTRODUCTION

Although the proportion of American adults who smoke is at an all-time low (19.8%) it does not reach the Healthy People 2010 target of 12%.¹ Consequently, tobacco control advocates and investigators have begun to explore nontraditional health care venues for smoking cessation interventions, including emergency departments (EDs), dentist offices, and pharmacies.^{2,3} Based largely on the high prevalence of tobacco use and illness in ED

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patients,⁴⁻⁸ and the results of feasibility studies,⁹⁻¹¹ the ED was mentioned for the first time as an appropriate venue for tobacco interventions in a report by the Institute of Medicine² and the latest version of the US Public Health Service's clinical practice guideline for tobacco dependence treatment.³

To date, there have been few published clinical trials of interventions for ED smokers. Bock et al. randomized 543 smokers admitted to a chest pain unit either to usual care or a tailored intervention consisting of a motivational interview and telephone follow-up.¹⁰ Nicotine replacement therapy was offered to individuals in either arm who wanted to quit. Subjects in the intervention arm had a higher abstinence rate at 1 month (27.3% vs. 16.8%); at months 3 and 6, there was no difference between groups. Neuner et al. randomized 1,044 subjects to onsite counseling plus four booster sessions or usual care, and found 12 month self-reported abstinence rates of 14.2% and 11.3%, respectively ($p = 0.12$).¹²

In summary, the extant research of interventions for ED smokers has yielded modest results. Reasons for this are unclear, but may pertain to the intensity and frequency of the intervention, the failure to screen smokers for interest in quitting, the lack of training in tobacco dependence counseling, and the lack of follow up.

It has been suggested that patients in the ED with an illness or injury attributable to a specific behavior may be amenable to a "teachable moment," in which a focused intervention may prompt a behavior change.¹³ This intervention model has been best evaluated in patients presenting with hazardous or harmful drinking.¹⁴ Known as Screening, Brief Intervention, and Referral to Treatment (SBIRT), it has been endorsed by a number of federal agencies and professional societies, including the Substance Abuse and Mental Health Services Administration (SAMHSA).¹⁵

The current study sought to address the lack of directed screening, intervention, and follow-up of previous cessation studies and identify correlates of cessation by adapting the SBIRT model for adult smokers in the ED. Our goal was to maximize the intensity of the intervention by using a trained peer educator, focusing on patients with sufficient motivation to quit, with meticulous follow-up. Further, we were interested in examining whether the fact or belief that smoking was related to one's ED visit or illness contributed to behavior change in response to the intervention. The study was a randomized trial with blinded assessment of a multicomponent intervention in the ED to identify, screen, counsel, refer, and follow up adult smokers in a medically underserved, lower socioeconomic status, largely Hispanic and African American population in Bronx, New York.

Our primary hypothesis was that adult smokers in the contemplation or preparation stage of change who receive a brief, intensive intervention in the ED are more likely to quit smoking within three months of the ED visit than similarly staged smokers who receive a minimal intervention or usual care.

Secondary hypotheses included:

- Adult smokers who visit the ED with a tobacco-related illness (as defined by ICD9 code) are more likely to quit smoking within three months of the ED visit than smokers who present with a non-tobacco-related illness.
- Adult smokers who believe they already have a chronic smoking-related illness are more likely to quit smoking within three months of the ED visit than smokers who do not believe they have a smoking-related illness.

- Adult smokers who believe their ED visit was caused by, or related to, smoking are more likely to quit within three months of the ED visit than smokers who do not believe their ED visit was caused by, or related to, smoking.

METHODS

Theoretical Model

Stages of change—The psychobehavioral model used in this study is the transtheoretical stages of change model of Prochaska and DiClemente.¹⁶⁻¹⁸ This model postulates five stages through which individuals seeking to end an addictive behavior progress: precontemplation, contemplation, preparation, action, and maintenance. Central to the model is the notion that interventions to change behavior are most effective if tailored to the stage of change. The subjects in this study were in the contemplation or preparation stage of change, to enhance the likelihood of quitting and willingness to accept the intervention.

Choice of motivational interview—The motivational interview (MI)¹⁹ was chosen as the behavioral technique for several reasons, including its empathic, nonconfrontational, client-centered approach, and compatibility with adjunctive methods such as written materials and telephone contact.²⁰ MI focuses on enhancing education, validation, and self-efficacy while motivating behavioral change. The intervention incorporates motivational approaches: soliciting permission and engagement from the subject, assessing readiness to change and decisional balance, providing feedback, practicing empathy, providing choice, decreasing desirability, giving advice, removing barriers, actively helping, and clarifying goals. MI has become a common therapeutic technique in promoting behavior change in urgent care and ED settings for smokers, alcohol abusers, and substance users.^{10,21-24} The adaptability of MI to the time constraints of ED practice makes it a particularly attractive technique for behavioral change.

Study Design

This was a single-hospital randomized trial with blinded assessment of a brief motivational interview, provision of literature, and follow-up contacts versus clinic referral alone. The study was approved by the Institutional Review Board of Montefiore Medical Center and registered at ClinicalTrials.gov (NCT00297466). Written informed consent was given by all subjects.

Study Setting and Population

An academic medical center ED that treats 90,000 adults/year in a medically underserved urban community, and is the primary teaching site for an emergency medicine residency program.

Inclusion criteria—Subjects who endorsed smoking at least 100 cigarettes lifetime, were currently every- or some-day smokers, who smoke at least 10 cigarettes daily on the days they smoke, who did not require admission to the hospital, were age 21 years or older, spoke English or Spanish, were able to give informed consent, and who were found to be in the contemplation or preparation stage of change following an initial screening interview were eligible for enrollment.

Subjects were screened after the initial history taking, physical examination, and treatment by the treating physician. A trained, bilingual research associate asked the physician if the subject was likely to be discharged or admitted. Those who were likely to be discharged were screened for study enrollment. Subjects who entered into the study, but were subsequently admitted to hospital, were excluded. After being screened by the research

associate, subjects were then seen by the interventionist who delivered either the enhanced or usual care intervention, as indicated by randomization.

Exclusion criteria—Subjects were excluded for critical illness, admission to the hospital, primary residence out of state, leaving the ED against medical advice or without being seen by a physician, or having predominantly psychiatric complaints. Subjects with predominantly psychiatric complaints were excluded because they are triaged to and treated in a psychiatric ED, a geographically separate area adjacent to the adult ED. The heavy patient volume in the adult ED would have precluded the research associates and tobacco interventionist from having sufficient time to visit the psychiatric ED.

Study Protocol

Usual Care group—Subjects in the Usual Care group were given a brochure describing the health risks of smoking, and provided contact information for all smoking cessation programs in New York Montefiore Medical Center, and the New York State Smokers' Quitline. Subjects whose first language is English received "You Can Quit Smoking," a brochure published by the Public Health Service that accompanied the 2000 clinical practice guideline.²⁵ Subjects whose first language was Spanish received a brochure from National Institutes of Health (NIH) that incorporates the same material.²⁶ These subjects received no additional ED intervention.

Enhanced Care group—This group received the same brochures as the Usual Care group. The Enhanced Care group also reviewed, with the interventionist, a pamphlet addressing smoking cessation in greater detail. African American and Hispanic subjects, who jointly comprised most study participants, reviewed additional culturally and linguistically appropriate written materials in the ED.^{27,28}

For African American subjects, the interventionist reviewed the brochure "Pathways to Freedom: Winning the Fight Against Tobacco,"²⁷ developed jointly by the Fox Chase Cancer Center, the National Cancer Institute, the American Cancer Society, and the Centers for Disease Control and Prevention. For Spanish-speaking subjects, the bilingual interventionist reviewed the brochure "No lo deje para mañana, deje de fumar hoy: Guía para Dejar de Fumar," (Guide To Quitting Smoking: Don't Leave It for Tomorrow, Quit Today), developed at the University of California at San Francisco and the National Cancer Institute (NCI).²⁸ Both of these full-color, glossy brochures discuss the health benefits of quitting, and provide strategies to do so using themes, text, and images sensitive to these respective populations of smokers.

Motivational interview—The Enhanced Care subjects also received, from the interventionist, a 10-15 minute brief MI based on the Motivational Interviewing Theory of Miller and Rollnick.¹⁹

Assessment of treatment fidelity—The interventionist completed a checklist for each subject encounter to ensure that all elements of the MI were covered. All subjects randomized to the Enhanced Care group had their MIs audiotaped by digital voice recorder. The tapes were reviewed jointly every two weeks by the interventionist and a health psychologist to assess treatment fidelity, reinforce the principles of MI, and address any other issues.

Cultural competence—In order to provide a culturally competent intervention, the interventionist was a fluently bilingual (English/Spanish) Bronx resident, of Dominican

heritage. All informed consent documents, HIPAA forms, and tobacco treatment materials were prepared in English and translated into Spanish by a professional service.

Subjects in the Enhanced Care arm received a follow-up telephone call from the interventionist 48-72 hours after the ED visit. During the call the interventionist asked how the subject was feeling, encouraged him or her to call the quitline, make a quit attempt, use the nicotine patches, or attend a cessation program.

All subjects in the Enhanced Care group receive a six-week course of nicotine patches, consisting of 14 days of 21mg patches, 14 days of 14mg, and 14 days of 7mg. Patches were donated by the New York State Smokers' Quitline.

Training of the interventionist—The interventionist received two weeks of training. First, she attended a well-regarded 5-day course in tobacco dependence treatment at the University of Medicine and Dentistry of New Jersey. This course reviews the epidemiology, health effects, and treatment of tobacco dependence, and offers certification in treatment. The following week, the interventionist did a weeklong practicum at the Brief Negotiated Interview and Active Referral to Treatment (BNI-ART) Institute of Boston Medical Center, learning to adapt the principles of motivational interviewing to the ED setting. The practicum consisted of role plays, slide shows, and observation of BNI-ART interventionists in the ED.

The interventionist was trained by the study investigators to connect the subject's current medical problem with his or her smoking. These diagnoses mostly included respiratory disorders such as bronchitis and asthma, but also chest pain and gastritis.

Follow-up—All subjects were contacted (by telephone, fax, or letter) at three months post-intervention to assess smoking status, number and duration of quit attempts and stage of change. The research assistant who made these contacts was not the interventionist, and was blinded to group assignment. All subjects were asked to return to the ED once, for measurements of exhaled carbon monoxide and salivary cotinine, a metabolite of nicotine. All subjects who returned received a \$4 transportation voucher and compensation of \$25. Salivary cotinine was measured with a commercially available kit (NicAlert, Nymox Corp., Maywood, NJ).

Measurements

Baseline variables—Each subject had recorded standard demographic information, including age, sex, race/ethnicity, insurance status, marital/relationship status, level of education, employment status, and presence and number of children in household. Clinical information included chief complaint, primary and secondary International Classification of Diseases, ninth revision (ICD-9) diagnoses for the ED visit, and the modified Patient Health Questionnaire-2 (PHQ-2) depression screen.²⁹ Tobacco use history included daily cigarette consumption, number and timing of prior quit attempts, stage of change as measured by the 9-point Ladder of Change,³⁰ the 6-item Fagerstrom Test for Nicotine Dependence,³¹ presence of other smokers in household, daily cigarette consumption, beliefs addressing the relationship between smoking and illness or reason for ED use. Data on alcohol and drug use were collected via the 4-item Rapid Alcohol Problems Screen³² and Rapid Drug Problems Screen.³³ Biochemical verification of tobacco use was performed by point-of-care measurement of exhaled carbon monoxide. Testing was performed by the study interventionist using the Micro-3 breath carbon monoxide monitor (Bedfont Scientific Ltd., Rochester, UK).

Screening variables—Smokers were identified by endorsing two questions: lifetime use of at least 100 cigarettes, current every- or some-day use of cigarettes. These are the same questions used by the Center for Disease Control and Prevention (CDC)’s Behavioral Risk Factor Surveillance System.³⁴ Eligible smokers smoked at least 10 cigarettes daily, to ensure eligibility for use of nicotine replacement therapy. Enrolled subjects completed a stages-of-change assessment using the Ladder of Contemplation, which represents motivation as a vertically oriented numerical rating scale.^{30,16,18} Subjects scoring as precontemplators (responses 7-9), or those in the action phase of quitting (response 1), were excluded from the study. (Strictly speaking, response 6, “Often think about quitting but have no plans to quit” would qualify as a precontemplator. However, 25% of the smokers in our pilot study gave this response. Because their motivation to quit places them near the contemplators, we decided to maintain study eligibility for these subjects. Recent literature suggests the contemplation ladder may provide a more sensitive, finely graded measure of motivation to quit than conventional Prochaska-DiClemente staging.³⁵) Contemplators and preparers completed the 2-question PHQ-2 depression screen.²⁹

Independent variable—The primary independent variable was assignment to the Usual Care or Enhanced Care group. Additional independent variables for prespecified secondary analyses were categorization of subjects into those who 1) had smoking-related primary or secondary ICD9 codes for that visit, 2) believed they had a pre-existing smoking-related medical condition, and 3) believed that their ED visit was caused by or related to smoking. The ICD9 codes used to designate subjects as having a smoking-related reason for the ED visit are those listed in the 1989 Surgeon General’s report, and have been used previously in ED-initiated smoking studies.^{6,13,36} Any primary or secondary ICD9 codes (up to four total) designated the subject as having a smoking-related reason for the ED visit. Based on pilot work, we expected about 15% of all smokers’ visits to be smoking-related.

Primary endpoint—The primary endpoint was cessation at three months, defined as no smoking during the seven days preceding the follow-up phone call. Subjects who endorsed abstinence by phone were asked to return to the ED to provide salivary cotinine and exhaled carbon monoxide samples. A positive cotinine sample was considered as evidence of current smoking, unless the subject was using nicotine replacement products, in which case the carbon monoxide level was used. Losses to follow-up were counted as smokers. These are standard methods to operationalize cessation in trials of tobacco dependence treatment.³⁷

Secondary endpoints—Secondary outcomes were quit attempt of at least 24 hours’ duration, smoking in the past 30 days, attendance at the cessation clinic, and change in the Ladder of Change score. These measures were recommended by an expert panel convened by the Society for Research on Nicotine and Tobacco (SRNT).³⁷

Randomization—An on-line random plan generator (<http://www.randomization.com>) was used to generate an allocation schedule, using the number of treatments (2), an allocation ratio of 1:1, and a block size of 6. The schedule was then used to prepare a set of opaque consecutively numbered envelopes with the treatment group indicated inside the envelope. The allocation schedule and envelopes were prepared by study personnel who were not involved in enrollment of subjects.

Data Analysis

Sample size calculation—According to the 2000 Public Health Service guidelines, estimated efficacy rates for smoking cessation programs range from 10.8% to 16.8%, with efficacy increasing as the intensity of the intervention increases.³⁸ One multicomponent intervention at eight community-based primary care clinics showed a two-month abstinence

rate of 16.4% in the intervention group, vs. 5.8% in the control group ($p < 0.001$).³⁹ We therefore considered a difference in cessation rates between groups of 9% as clinically important, and an appropriate adaptation of data from the primary care setting to the emergency care setting.

Based on previous work,^{11,40} we expected (at most) 3% of smokers in the Usual Care group to be abstinent at three months. With a projected abstinence rate of 12% in the Enhanced Care arm, and using a two-sided alpha of 0.05, and beta of 0.2, 134 subjects in the contemplation or preparation stages of change were needed in each arm of the study. To account for a potential 20% loss during follow-up, 161 subjects were to be recruited for each arm of the study, for a final sample size of 322. The sample size calculation was done using NQUERY Advisor Release 3.0, based on the normal approximation to the binomial distribution with a continuity correction.

Data were double-entered into Microsoft Excel (Microsoft, Redmond, WA), checked for logical inconsistencies, and cleaned. They were then imported into SPSS 16.0 (SPSS, Chicago, IL) which was used for all analyses. Univariate and bivariate data are reported with means and medians, as appropriate. Logistic models were fitted for the primary endpoint, with variables selected for inclusion based on clinical criteria, not a prespecified P value from bivariate analyses. Five variables related to tobacco behavior were chosen, to avoid overfitting.⁴¹ Regression diagnostics, including a goodness-of-fit test, were calculated. Analysis was by intention-to-treat.

RESULTS

In this trial, 338 subjects were enrolled. They were primarily Hispanic, with a mean age of 40.2 (SD ± 12.0) years, and 51.8% were female. Baseline demographics and smoking profiles between the two groups are comparable, as shown in Table 1. Over half were uninsured or had Medicaid (Table 1). Figure 1 shows the flow of subjects through the trial. Overall, 83.1% of all subjects were reached at three months. There was excellent agreement (84%) between the three-month exhaled carbon monoxide and salivary cotinine readings. In Table 2, main results for the study are shown. Both groups showed substantial improvement in the proportion of subjects reporting seven-day abstinence at three months (14.7% v. 13.2% for Enhanced vs. Usual Care), the proportion of subjects making a quit attempt, and the number of cigarettes smoked daily. Contrary to our hypothesis, differences between groups were not statistically significant. There was excellent agreement (85%) between smoking self-report and biochemical verification. There were no differences in response to the intervention by subject age, sex, race, or insurance status.

Important prespecified secondary endpoints were positive, as noted in Table 3. Specifically, subjects with a tobacco-related discharge diagnosis were more likely to quit (as measured by 7-day point prevalence) than subjects without a tobacco-related diagnosis (25.0% vs. 11.2%, $p = 0.002$); subjects who thought their ED visit was caused by or related to tobacco use possibly were more likely to quit (18.5% vs. 11.3%, $p = 0.06$). Conversely, subjects who believed they had a pre-existing tobacco-related condition were less likely to quit (9.8% vs. 18.5%, $p = 0.02$).

Table 4 summarizes the multivariate logistic model. In brief, factors independently associated with three-month abstinence included having any tobacco-related ICD-9 code for the ED visit, or subject belief that the ED visit was related to smoking. Conversely, subject belief that he or she had a pre-existing tobacco-related illness was associated with continued smoking at three months. Study arm and level of motivation to quit, measured by the Ladder

score, were not associated with smoking status at follow-up. The model showed acceptable goodness-of-fit, with a Hosmer-Lemeshow $p = 0.67$, and a Nagelkerke R^2 of 0.126.

DISCUSSION

Subjects in this randomized trial of an SBIRT model for smoking received a full array of tobacco treatment services: direct provision of nicotine replacement therapy (NRT) from the ED, motivational interviewing, print materials, and rigorous blinded follow-up that included biochemical verification of tobacco use. Although the primary endpoint was negative, the data suggest that cessation interventions in the ED intervention are feasible. In particular, the relatively high rate of cessation among the usual care arm suggests that a minimal intervention in this setting may be just as effective as a multi-component one, at least for patients already in the preparation or contemplation stages of change, as ours were. Of note, we cannot assess the effect a motivational interview might have had on precontemplators, as they were excluded from enrollment.

The results also reinforce the salience of the Health Beliefs Model⁴² as a useful analytic framework, with the “cue to action” typically reframed in the ED literature as the “teachable moment.” They are also consistent with Bock et al.’s findings in chest pain patients.⁴³ As expected, subjects in our study whose ED visit was related to a tobacco-related condition, based on diagnosis or perception, were more likely to quit. On the other hand, subjects who perceived themselves as living with a pre-existing tobacco-related condition were more resistant to the effects of the intervention, and in fact less likely to quit. This may reflect a greater prevalence of fatalism in the subjects with a perceived tobacco-related condition. Fatalism has been associated with decreased adherence to cancer prevention behaviors, including tobacco abstinence, and is more common in lower socioeconomic groups, such as those in this study.⁴⁴

This seeming contradiction may speak to the conditions under which the teachable moment has the greatest impact. That is, individuals who do not know they have a smoking-related health condition may be more ‘primed’ to respond to a smoking-related event than those who believe they already have one. This finding suggests that the intervention should reinforce the connection between the ED visit and smoking, as well as the ability of cessation to stop and reverse the course of smoking-related illness.

Smoking cessation interventions represent a health care service for which a substantial body of evidence attests to efficacy and effectiveness, and to which racial and ethnic minorities have decreased access relative to whites.^{45,46} Insofar as 24.6% of U.S. ED patients are African American, and 13.0% endorse Hispanic ethnicity,⁴⁷ ED-based tobacco SBIRT may increase these groups’ opportunities to receive evidence-based tobacco treatment.

We think it is unlikely that the lack of significant differences between the Enhanced and Usual Care groups reflects ineffective delivery of MI or other interventions by the study interventionist. The interventionist met biweekly for audiotape review and feedback with a health psychologist, who reported good fidelity to protocol.

Using lay educators as the interventionist offers at least two theoretical advantages: 1) they can reflect the ethnic, racial, and socioeconomic background of the local patient population; 2) if they are former smokers, as ours was, they may have additional insight into the connections between smoking and the various health problems with which study subjects may present.

Lay educators have successfully delivered MI to patients with substance use disorders. One group found that lay educators trained in MI were able to promote abstinence from cocaine

and heroin in a cohort of largely nonwhite, economically disadvantaged patients.²¹ Subjects received a 20-minute motivational interview in a clinic setting, handouts, and a 10-day booster call. The six-month abstinence rates for the intervention and control groups were, respectively, 22% and 16% (cocaine only), 40% and 30% (heroin only), and 17% and 12% (both drugs).

The methodologies and conceptual framework for ED-based tobacco control are adapted from earlier ED interventions in alcohol abuse and injury. Brief ED-based interventions for patients with hazardous and harmful drinking have been shown to reduce alcohol consumption and re-injury rates at 12 months follow-up.⁴⁸⁻⁵⁰ Although this study employed a full-time ED-based interventionist, these SBIRT interventions are amenable to being taught to and practiced by emergency physicians.⁵¹

The prevalence of a positive depression screen in the cohort (69.1%) is striking, and may have contributed to the negative primary result. Smoking is highly prevalent among individuals with mood disorders, reportedly as high as 61%,⁵² and smokers who are depressed are more likely to relapse early after a quit attempt than non-depressed smokers.⁵³ Future interventions may need to provide referral for mood disorders, which may assist in tobacco dependence treatment.

LIMITATIONS

The use of one interventionist to deliver both the enhanced and usual care interventions may have resulted in some contamination. We attempted to control for this by biweekly review of the motivational interview tapes, and reinforcement of the minimalist nature of the Usual Care condition. We did not tape subject encounters in the control condition.

Discharge from the ED was an inclusion criterion for this study. Because smokers are disproportionately admitted to hospital compared to nonsmokers, many otherwise eligible subjects were excluded. Moreover, being admitted may offer a more sustainable ‘teachable moment’ due to the greater intensity of the medical encounter.

Many residents in our catchment area move frequently. While we experienced a moderate level of loss to follow-up among both groups, we addressed this to the best of our ability by limiting enrollment to subjects whose primary residence is the Bronx, and obtaining multiple types of contact information, including home and work telephone numbers, email, and home addresses. In addition, all research associates for this study were bilingual, from local neighborhoods, and hence culturally competent to recruit Spanish-speaking subjects. We also took the conservative approach of designating those lost to follow-up as continuing to smoke.

The external validity of this study may be limited, because employing a peer educator and distributing nicotine replacement therapy to subjects are not strategies easily available to physicians in other EDs. Future work planned by this group will focus on ways to enhance physician training to incorporate smoking cessation into their routine practice of emergency medicine. Further, we hope to examine tailoring of interventions to enhance the salience of the teachable moment for more resistant smokers, as well as provide components to address depression and mood symptoms.

Assessment reactivity may have contributed to the higher-than-expected quit rate in the control group. This phenomenon has been reported previously in ED-based trials of alcohol interventions,⁵⁴ and concerns the ability of a series of questions about a health behavior to influence the subject’s behavior.¹⁴ In effect, the intake assessment constitutes a kind of intervention, even for the control subjects. In this study, the baseline survey contained 89

items, and took about 15 minutes to administer. Because 27 of these items concerned smoking, the effect may have been to provide an intervention to the control subjects, even in the absence of a motivational interview. In addition, control group subjects received a brochure that provides great detail about the risks of smoking, as well as contact information for local treatment programs and the state smokers' quitline. True "usual care" of subjects in our ED does not include provision of the brochure, nor a brief discussion with an interventionist about its contents. Thus, subjects in the Usual Care arm of this trial received interventions well in excess of true usual care. This may have attenuated the difference between treatment groups. Future work can control for this either with a usual care group that involves minimal initial assessment, or an "attention control" arm where the assessment takes as long as in the intervention arm, but the content does not address smoking.

CONCLUSIONS

Subjects in the Usual Care group received an intervention comparable to what busy clinicians can do: query ED patients about smoking, advise them to quit, refer them to a local treatment program and/or quitline, and give them printed materials reinforcing these concepts. Hence, it may not be necessary to invest in a program of ED-based health educators and medication dispensing to effect a modest but clinically significant improvement in ED patients' smoking behavior. This is particularly salient given the substantial number of racial and ethnic minorities in this cohort, and their lower socioeconomic status. The primary endpoint, although negative, suggests that routine screening, brief intervention, and referral to treatment may prompt a substantial number of quit attempts, decreased cigarette consumption, and successful quits, if offered routinely across the large population of ED smokers.

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Figure 1.
Flow chart of patients through the study.

Table 1

Patient characteristics.

Variable	Usual Care (n = 168)	Enhanced Care (n = 170)
Age mean ($\pm$ SD) years	41.0 ($\pm$ 12.2)	39.5 ($\pm$ 11.8)
Sex, % male	50.6	45.3
Race/ethnicity		
White	9.0	10.6
African American	23.8	21.2
Hispanic	60.1	62.9
Asian/other	7.1	5.3
Insurance		
Self-pay/none	14.3	11.8
Medicaid	44.6	42.4
Medicare	4.2	4.0
Other/missing	36.9	41.8
Depression screen (+)	65.3	72.9
Cigarettes/day, median (IQR)	15 (10-20)	15 (10-20)
Fagerstrom score, median (IQR)	6 (5-8)	7 (5-8)
Interest in quitting, median response	next 30 days	next 30 days
Chest pain/Dyspnea	39.5	37.1

Values are reported as percent unless otherwise noted.

IQR = interquartile range

Table 2

Results of randomized trial of an ED-based cessation intervention.

Variable	Usual Care (n = 168)	Enhanced Care (n = 170)	P value
24 hour quit attempt since ED visit	111 (66.1%)	117 (69.2%)	0.53
7-day abstinence	22 (13.2%)	25 (14.7%)	0.68
Decrease, daily cigarette consumption, median (IQR)	-1 (-9.5 to 0.0)	-5 (-10.0 to 0.0)	0.21
Decrease in Ladder of Change score, median (IQR)	-0.3 (-0.6 to 0.1)	-0.5 (-0.8 to -0.2)	0.49
Called Quitline, attended cessation clinic, or discussed smoking with doctor since ED visit	51 (30.4%)	51 (30.0%)	0.94

Table 3

Quit rate, bivariate stratified analysis (7-day abstinence).

Variable	% Yes	% No	P value
Tobacco-related ICD-9	25.0 (17/68)	11.2 (30/267)	0.002
ED visit related to tobacco (patient belief)	18.5 (23/124)	11.3 (24/212)	0.06
Medical illness related to tobacco (patient belief)	9.8 (17/174)	18.5 (30/162)	0.02

ICD-9 = International Classification of Diseases, ninth revision

All rows proportion = (No. of subjects with verified 7-day abstinence at 3 months)/(No. of subjects with a tobacco-related ICD9 code for row A, ED visit related to tobacco for row B, or belief they have a medical illness related to tobacco for row C)

Table 4

Multivariate logistic model for odds of 3-month abstinence

Variable	OR	95% CI
Any tobacco-related ICD-9 code for ED visit	3.42	1.61-7.26
Subject believes ED visit is tobacco related	2.47	1.17-5.21
Subject believes he or she has tobacco-related illness	0.22	0.10-0.50
Study Arm (Usual Care is referent group)	1.30	0.68-2.48
Ladder of Contemplation score	0.95	0.78-1.15

ICD-9 = International Classification of Diseases, ninth revision