

Predictors of Successful Telephone Contact After Emergency Department-based Recruitment into a Multicenter Smoking Cessation Cohort Study

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Introduction: Emergency department (ED) studies often require follow-up with subjects to assess outcomes and adverse events. Our objective was to identify baseline subject characteristics associated with successful contact at 3 time points after the index ED visit within a sample of cigarette smokers.

Methods: This study is a secondary analysis of a prospective cohort. We recruited current adult smokers at 10 U.S. EDs and collected baseline demographics, smoking profile, substance abuse, health conditions, and contact information. Site investigators attempted contact at 2 weeks, 3 months, and 6 months to assess smoking prevalence and quit attempts. Subjects were paid \$20 for successful follow-up at each time point. We analyzed data using logistic and Poisson regressions.

Results: Of 375 recruited subjects, 270 (72%) were contacted at 2 weeks, 245 (65%) at 3 months, and 217 (58%) at 6 months. Overall, 175 (47%) were contacted at 3 of 3, 71 (19%) at 2 of 3, 62 (17%) at 1 of 3, and 66 (18%) at 0 of 3 time points. At 6 months, predictors of successful contact were: older age (adjusted odds ratio [AOR] 1.2 [95%CI, 0.99–1.5] per ↑10 years); female sex (AOR 1.7 [95%CI, 1.04–2.8]); non-Hispanic black (AOR 2.3 [95%CI, 1.2–4.5]) vs Hispanic; private insurance (AOR 2.0 [95%CI, 1.03–3.8]) and Medicare (AOR 5.7 [95%CI, 1.5–22]) vs no insurance; and no recreational drug use (AOR 3.2 [95%CI, 1.6–6.3]). The characteristics independently predictive of the total number of successful contacts were: age (incidence rate ratio [IRR] 1.06 [95%CI, 1.00–1.13] per ↑10 years); female sex (IRR 1.18 [95%CI, 1.01–1.40]); and no recreational drug use (IRR 1.37 [95%CI, 1.07–1.74]). Variables related to smoking cessation (e.g., cigarette packs-years, readiness to quit smoking) and amount of contact information provided were not associated with successful contact.

Conclusion: Successful contact 2 weeks after the ED visit was 72% but decreased to 58% by 6 months, despite modest financial incentives. Older, female, and non-drug abusing participants were the most likely to be contacted. Strategies to optimize longitudinal follow-up rates, with limited sacrifice of generalizability, remain an important challenge for ED-based research. This is particularly true for studies on substance abusers and other difficult-to-reach populations.
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INTRODUCTION

The ability to obtain successful telephone contact with patients after emergency department (ED) visits has important implications for clinical care and research. Telephone follow-up is used for a variety of clinical applications, which include monitoring changes in health status; ensuring compliance with discharge instructions; notifying patients of new results or follow-up appointments; and quality improvement and patient satisfaction surveys.¹⁻⁴ For observational and interventional studies, longitudinal follow-up after ED visits is vital to measure patient outcomes, including change in condition, responses to interventions, and adverse events. Although methods of analyzing missing or incomplete data have been established,^{5,6} having study subjects that are lost to follow-up reduces sample size and precision, and often introduces bias because missing data are rarely random events.^{7,8} Some investigators have even cautioned against telephone calls as the sole means of follow-up for ED patients, although the vast majority of longitudinal ED-based research uses this method.⁹

Several studies have analyzed predictors of successful follow-up after ED visits for clinical and research outcomes.^{1,2,9-14} Recent ED-based public health initiatives have focused on screening, brief interventions, and referral for patients with substance abuse, including tobacco, alcohol, and recreational drugs.¹⁵ Neuner et al¹⁴ analyzed predictors of loss to follow-up in an ED-based intervention for problem alcohol use and found that tobacco use was the strongest predictor. Although cigarette smokers are often cited as a group that is difficult to contact after ED visits, no prior study has focused specifically on analysis of follow-up in a cohort of ED cigarette smokers.^{2,14,16-18} This topic is particularly important because of the growing interest in developing effective ED-based smoking cessation interventions, as suggested by a consensus of emergency medicine organizations,¹⁹ the Institute of Medicine,²⁰ and the US Preventive Service Task Force.²¹

Accordingly, the objective of this study was to identify baseline characteristics associated with successful contact at 3 time points after an index ED visit for a cohort of cigarette smokers. The results of this study have implications for other hard-to-study populations, including ED-based studies of disadvantaged populations and other substance abusers.

METHODS

Study Design, Setting, and Participants

This study is part of a prospective cohort study, conducted in 2008–2009, using subjects recruited from 10 EDs in 8 geographically diverse U.S. states. During a 10-day enrollment period, trained research staff screened consecutive ED patients for tobacco use. Patients were recruited during peak volume hours (9:00AM to midnight). Each site enrolled a minimum of 36 subjects.

Eligible subjects were 18 years or older who currently smoked cigarettes and met the Centers for Disease Control and Prevention definition for being a smoker, based on

response to the question: “Have you smoked at least 100 cigarettes (5 packs) in your life?” There was no minimum smoking rate, and we enrolled both daily and non-daily smokers, based on the response to the question: “Do you now smoke cigarettes every day, some days, or not at all?” Response choices were “currently smoke every day”; “currently smoke some days”; or “currently do not smoke”. We excluded patients with illnesses that precluded conversation or adequate comprehension of the study’s requirements, including those with altered mental status, acute intoxication, hostile or agitated behavior, an insurmountable language barrier, or severe illness (e.g., intubation, persistent vomiting). In addition, subjects with high risk of being lost to follow-up were excluded, including those who had no current residence, a transient residence (planned to move during the next 6 months), or no access to a telephone that is always in service. However, we did not exclude individuals based on their alcohol or drug use.

Data Collection

Subjects completed a self-administered, paper-and-pencil baseline assessment in the ED to collect data on smoking-related variables and predictors of cessation. Assessments were printed in both English and Spanish. To accommodate patients with poor eyesight or illiteracy, the assessment could be completed through research staff interview. To reduce demand bias, which could lead to under-reporting of tobacco use and over-reporting of interest in cessation, participants were re-assured that their responses would not be shared with their treating clinicians. The specific measures used for this paper, which represent a subset of the full battery, are described under the *Measures* section.

All subjects received treatment-as-usual by their medical providers for their tobacco use. The research staff did not provide any counseling; however, after baseline data collection was complete, subjects received an educational pamphlet on smoking cessation published by the U.S. Department of Health and Human Services (www.ahrq.gov/consumer/tobacco/helpsmokers.htm) and a list of tobacco cessation treatment options, which included a National Quitline telephone number (1-800-QUIT-NOW). Furthermore, subjects who screened positive for depression, alcohol, or drug use were given the respective educational pamphlet published by the Association for Behavioral and Cognitive Therapies (www.abct.org), as well as brochures with national mental health hotlines and state-based behavioral health referral services (findtreatment.samhsa.gov).

Contact information included primary and secondary phone numbers; phone number(s) for up to 2 alternate contact people; phone number type (daytime, nighttime, or cellular); and addresses for the subject and alternate contacts. Site research staff attempted telephone follow-up interviews 2 weeks, 3 months, and 6 months after the ED visit to assess their smoking behavior, including quit attempts and 7-day

abstinence. The *primary outcome* for this study was the number successful contacts for the 3 time points (range 0 = 3). A maximum call window of 7 days was used with at least 3 attempts to each valid phone number made before the contact attempt was deemed unsuccessful. Calls were spaced across times of day (morning, afternoon, evening), and occurred on at least 2 different days. To improve response rates, modest financial incentives were provided to participants (\$20) and sites (\$50) for each successful follow-up.

The study was coordinated by the Emergency Medicine Network (EMNet). Data collection forms were reviewed by EMNet staff and missing or inconsistent data were reconciled through communication with the sites. All data underwent double data entry. The institutional review boards at all 10 sites approved the study. Participants provided written informed consent.

Measures

Demographic data included age, sex, race/ethnicity, health insurance, educational level, and annual household income.

Smoking history was assessed using the average number of cigarettes smoked per day and cigarette pack-years.

Readiness to quit smoking was indexed by, "How ready are you to quit smoking within the next month (0 = not at all; 10 = 100% ready)?"^{22,23} A score of 1 through 5 was considered "low" readiness and 6 through 9 as "high" readiness.

Problem alcohol use was measured by the Rapid Alcohol Problem Scale (RAPS), a well-validated brief screener for alcohol-related problems.²⁴ The RAPS consists of 5 yes/no questions: "During the last year, have you had a feeling of guilt or regret after drinking?", "During the last year, has a friend or family member ever told you about things you said or did while you were drinking that you could not remember?", "During the last year, have you failed to do what was normally expected from you because of drinking?", "Do

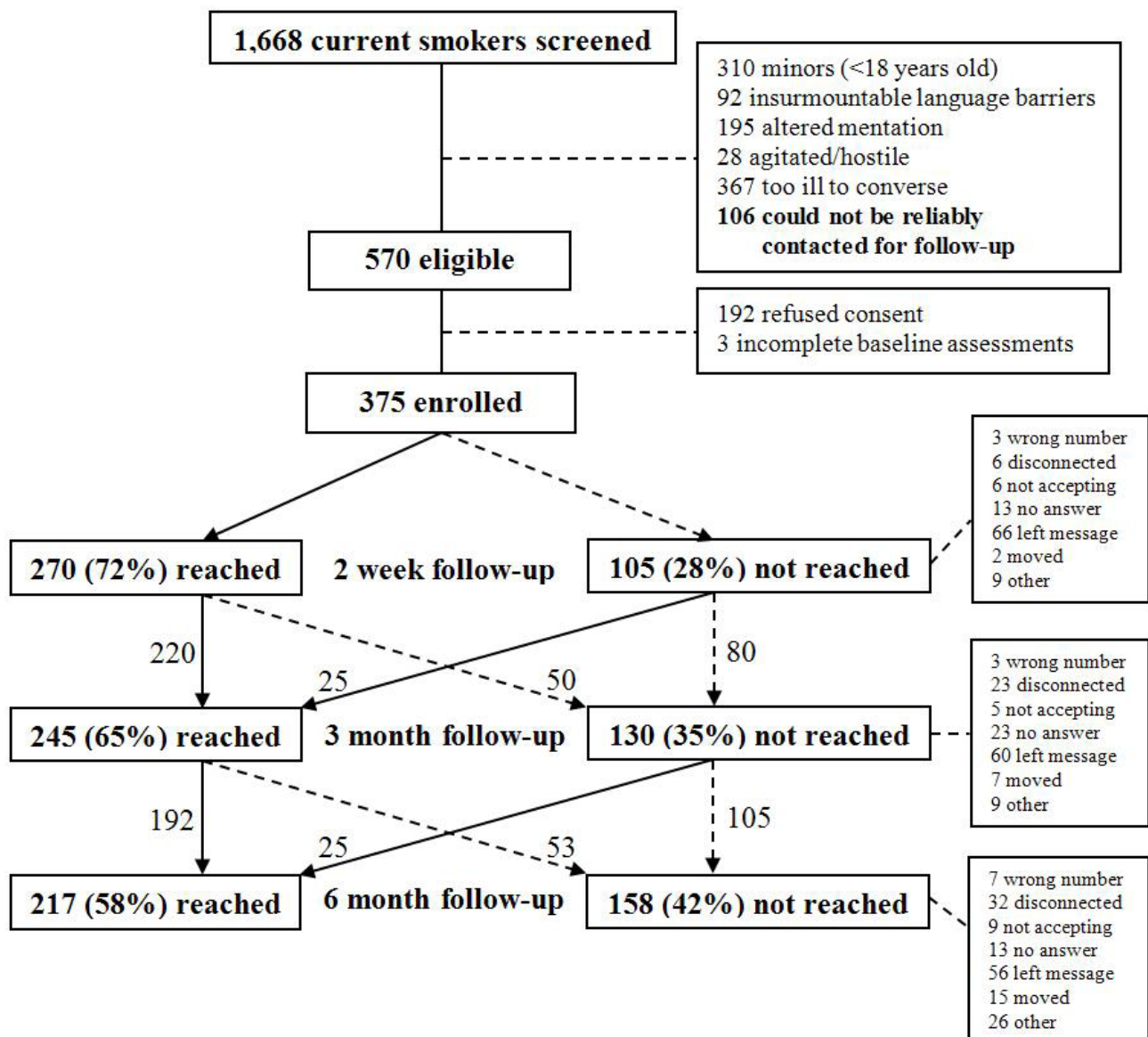


Figure 1. Eligibility and successful contact at 2 week, 3 month, and 6 month follow-up time points.

Table 1. Baseline characteristics of 375 enrolled participants.

Characteristics	n	%	Characteristics	n	%
Demographics			Substance abuse		
Age, years			Problem alcohol use		
18–29	96	26	None	134	36
30–44	128	34	RAPS screen negative	148	40
45–59	128	34	RAPS screen positive	89	24
≥ 60	22	6	Recreational drug use score		
Female sex	210	56	None	261	71
Race/ethnicity			Below RDPS cutoff	48	13
White, non-Hispanic	152	41	Above RDPS cutoff	59	16
Black, non-Hispanic	137	37	Clinical information		
Hispanic	73	20	Self-reported smoking-related illnesses		
Other/Multiracial	10	3	0	93	25
Health insurance			1–2	120	32
Private	79	22	≥ 3	162	43
Medicare	22	6	Depression	127	34
Medicaid or other public	129	37	Triage acuity		
Uninsured	123	35	1–2	58	16
High school graduate	282	76	3	181	50
Annual household income, \$			4–5	124	34
< 20,000	148	39	Emergency department disposition		
21,000–40,000	91	24	Admitted	91	24
≥ 41,000	57	15	Discharged	264	71
Don't know/confidential	79	21	LWBS/LAMA	17	5
Smoking history			Location Information		
Cigarettes per day			≥ 2 telephone numbers provided	141	38
1–10	198	54	Cell phone only provided	86	23
11–20	118	32	Alternate contact provided		
≥ 21	54	15	No	228	61
Cigarette pack-years			Yes, at same location	52	14
0–10	124	34	Yes, at different location	58	16
10.5–20	108	29	Yes, at unknown location	36	10
>20	136	37			
Readiness to quit smoking			RAPS, Rapid Alcohol Problem Scale; RDPS, Rapid Drug Problem Scale; LWBS, left without being seen; LAMA, left against medical advice		
Not at all	33	9	* Score of 1 to 5 was considered “low” readiness and 6 to 9 considered “high” readiness		
Low*	138	37			
High*	97	26			
Completely ready	107	29			

Table 1 continued →

Table 2. Association between baseline participant characteristics and successful contact at 6 months.

Characteristics	Successful contact n (%)	Adjusted odds ratio (95%CI)*	Characteristics	Successful contact n (%)	Adjusted odds ratio (95%CI)*
Total	217 (58%)	--	Problem alcohol use		
Demographics			None	73 (54%)	--
Age, years		1.2 (0.99-1.5)**	RAPS screen negative	93 (63%)	--
18–29	52 (54%)	--	RAPS screen positive	49 (55%)	--
30–44	66 (52%)	--	Recreational drug use score		
45–59	83 (65%)	--	None	169 (65%)	3.2 (1.6-6.3)***
≥ 60	15 (68%)	--	Below RDPS cutoff	25 (52%)	2.0 (0.8-4.7)
Female sex	134 (64%)	1.7 (1.04-2.8)***	Above RDPS cutoff	20 (34%)	Referent
Race/ethnicity			Clinical information		
White, non-Hispanic	92 (61%)	1.7 (0.9-3.2)	Self-reported smoking-related illnesses		
Black, non-Hispanic	86 (63%)	2.2 (1.2-4.5)***	0	45 (48%)	Referent
Hispanic	35 (48%)	Referent	1–2	70 (58%)	1.6 (0.9-3.0)
Other	4 (40%)	0.6 (0.1-2.6)	≥ 3	102 (63%)	1.6 (0.8-2.9)
Health insurance			Depression	77 (61%)	--
Private	54 (68%)	2.0 (1.03-3.8)***	Triage acuity		
Medicare	18 (82%)	5.7 (1.5-22)***	1–2	36 (62%)	--
Medicaid or other public	73 (57%)	1.2 (0.7-2.1)	3	109 (60%)	--
Uninsured	61 (50%)	Referent	4–5	67 (54%)	--
High school graduate	161 (57%)	--	Emergency department disposition		
Annual household income, \$			Admitted	56 (62%)	--
< 20,000	82 (55%)	--	Discharged	152 (58%)	--
21,000–40,000	53 (58%)	--	LWBS/LAMA	8 (47%)	--
≥ 41,000	36 (63%)	--	Location Information		
Don't know/confidential	46 (58%)	--	≥ 2 telephone numbers provided	86 (61%)	--
Smoking history			Cell phone only provided	55 (64%)	1.4 (0.8-2.4)
Cigarettes per day			Alternate contact provided		
1-10	118 (60%)	--	No	133 (58%)	--
11-20	66 (56%)	--	Yes, at same location	30 (58%)	--
≥ 21	31 (57%)	--	Yes, at different location	32 (55%)	--
Cigarette pack-years			Yes, at unknown location	22 (61%)	--
0-10	66 (53%)	--	RAPS, Rapid Alcohol Problem Scale; RDPS, Rapid Drug Problem Scale; LWBS, left without being seen; LAMA, left against medical advice		
10.5–20	64 (59%)	--	*Variables with $P < 0.20$ in unadjusted analysis included in the multivariable model		
≥ 20.5	83 (61%)	--	**per ↑10 years		
Readiness to quit smoking			*** $P < 0.05$		
Not at all ready	18 (55%)	--			
Low	77 (56%)	--			
High	57 (59%)	--			
Completely ready	65 (61%)	--			

Table 2 continued →

Table 3. Overall total number of successful follow-up contacts (range 0-3).

Number of time points with successful contact	n	%
3 of 3	175	47
2 of 3	71	19
1 of 3	62	17
0 of 3	66	18

you sometimes take a drink in the morning when you first get up?”, and “During the past year, have you lost friends or a significant other because of your drinking?” A score greater than 0 is used as a threshold to warrant further assessment of alcohol abuse or dependence.

Problem drug use was measured by the Rapid Drug Problem Scale (RDPS),²⁵ which is identical to the first 4 items of the RAPS with the exception that recreational drugs replace drinking. A score greater than 0 is used as a threshold to warrant further assessment of recreational drug abuse or dependence.

Smoking-related illnesses were categorized based on whether they met criteria for a smoking-related disease as outlined by the US Surgeon General.²⁶ This is a commonly used strategy to classify smoking-related diseases and has been applied successfully to ED patients.^{27,28}

The *Depression* screener consisted of the Patient Health Questionnaire-2,²⁹ a well-established, 2-item screener assessing sad mood and anhedonia over the past 2 weeks (0 = None/Little of the time, 1 = Some of the time, 2 = Most of the time, 3 = All of the time). A score greater than 0 on either item was considered a positive screen.

Additional clinical data included *triage acuity* (on a 5-point scale) and *ED disposition* (admit vs. discharge).

Data analysis

The primary goal of the data analyses was to measure the association between baseline participant characteristics and successful follow-up at 2 weeks, 3 months, and 6 months. We performed statistical analysis using Stata 10.1 (StataCorp, College Station, TX). Unadjusted associations between baseline characteristics and successful contact were analyzed using chi-square tests, or Fisher's exact test as appropriate. We included variables with unadjusted $p < 0.20$ in the multivariable models to minimize risk of overfitting (no variables were forced into the models).

Using multivariable logistic regression, we adjusted for participant characteristics to measure the association with successful contact at 6 months. In addition, we used multivariable Poisson regression to measure the association between baseline characteristics and the number of successful follow-up contacts (range 0-3). Two-tailed p -values < 0.05 were considered statistically significant. The goodness-of-fit

Table 4. Multivariable Poisson regression for number of successful follow-up contacts (range 0-3).

Characteristics*	Incidence rate ratio	95%CI
Age per ↑10 years	1.06**	1.00-1.13**
Female Sex	1.19**	1.01-1.40**
Health insurance		
Private	1.13	0.92-1.39
Medicare	1.21	0.89-1.65
Medicaid or other public	0.99	0.82-1.20
Uninsured	Referent	
Recreational drug use score		
None	1.37**	1.07-1.74**
Below RDPS cutoff	1.34	0.99-1.82
Above RDPS cutoff	Referent	
Smoking-related self-reported illnesses		
0	Referent	
1-2	1.10	0.89-1.36
≥ 3	1.12	0.91-1.37
≥ 2 telephone numbers provided	1.11	0.95-1.29

CI, confidence interval; RDPS, Rapid Drug Problem Scale;

*Variables with $p < 0.20$ in unadjusted analysis included in the multivariable model

** $p < 0.05$

for the multivariable models was confirmed using the Hosmer-Lemeshow test.

RESULTS

There were 8,241 patients who presented to the participant EDs during the 10-day enrollment period. Study staff screened 3,800 patients for potential enrollment, of which 2,132 (58%) were classified as non-smokers. For the remaining 1,668 current smokers, the numbers and reasons for exclusion are presented in Figure 1, and included 106 that did not have reliable contact information (non-stable residence, no telephone service). There were 378 patients enrolled into the study; 3 subjects were removed because of missing data, leaving 375 for this analysis.

The characteristics of study participants are shown in Table 1. Compared to patients who were not enrolled (i.e., not eligible, not approached, or refused), subjects were more likely to be younger, have Medicaid insurance, and be discharged (versus admitted) (all $p < 0.05$; data not shown). There were no differences observed between those enrolled and those not enrolled by sex or race/ethnicity.

The overall successful follow-up contacts declined with each successive time point (see Figure 1) —72% at 2 weeks,

65% at 3 months, and 58% at 6 months. However, there was cross-over between responders and non-responders at each time point, including 14 (18%) participants not contacted at 2 weeks or 3 months but who were successfully contacted at 6 months. At all time points, the most common reason for unsuccessful contact was a working phone number where voicemails were left and not returned; however wrong, changed, or disconnected telephone numbers were more common with later follow-up time points.

Unadjusted and adjusted associations between baseline characteristics and successful contact at 6 months are presented in Table 2. In unadjusted analysis, characteristics associated with higher rates of successful contact at 6 months included older age, female sex, non-Hispanic ethnicity, private or Medicare insurance, no recreational drug use, greater number of smoking related illnesses, and permanent residence. In the multivariable analysis, female sex, non-Hispanic black race, private insurance, Medicare, and no recreational drug use were associated with statistically significant higher odds of successful contact at 6 months.

The overall total number of successful follow-up contacts is displayed in Table 3. Most (82%) were successfully contacted at 1 or more time points, but only 47% were contacted at all 3 time points. The characteristics most predictive of the total number of successful contacts were older age, female sex, and no recreational drug use (Table 4).

DISCUSSION

In prior ED-based studies, current smokers have been cited as a group at risk for being lost to follow-up.^{2,14} In the present study that exclusively recruited current smokers, successful follow-up was challenging, despite modest financial incentives and efforts to exclude potential participants with limited or transient contact information. Factors found to be associated with increased odds of successful follow-up included older age, female sex, and no drug use. The major strengths of this study were recruitment at 10 geographically diverse sites and multiple follow-up time points.

Successful follow-up for clinical care or research requires two basic elements: (1) the participant must be found, and (2) the participant must be willing to cooperate with the purpose of the call (e.g., receive clinical results or research data collection). We excluded potential participants with no current residence, a transient residence, or no access to a telephone that is always in service to reduce the risk of inability to find the participant over the 6-month follow-up period (10% of exclusions). Additionally, financial incentives for participants and site investigators were meant to incent motivation to be located and complete follow-up.³⁰ Compared to clinical care follow-up where patients are typically motivated by their health to receive results or instructions, research participant cooperation with the purpose of follow-up is more challenging, particularly in behavioral health research. For the present study, for which the objective of assessing smoking

and smoking cessation rates over time was clear, participants may have had motivation to avoid follow-up calls from the guilt or embarrassment of continued smoking. This hypothesis requires further study.

Identifying baseline characteristics associated with successful contact may help to derive selection criteria that improve follow-up, particularly in study populations already at high risk for unsuccessful contact. However, the importance of high follow-up rates for internal validity must be weighed against the loss of generalizability (external validity) of study results. In this population of ED patients that currently smoke, problem recreational drug use was identified as the factor most likely associated with lower rates of successful contact at follow-up and potentially amenable to use as an exclusion criterion (compared to problem drug users, non drug users had an OR of 3.2 for successful follow-up at 6 months). This is consistent with prior studies of general ED patients.^{12,31} Also consistent with prior ED-based studies,^{2,13,14} younger age and male sex were also associated with lower contact rates (OR for successful follow-up at 6 months 1.2 per $\uparrow$ 10 years of age and 1.7 for female compared to male sex). However, restricted selection criteria on the basis of age or sex would severely limit generalizability of most ED-based studies. Additionally, younger men and substance abusers are typically at highest risk for risky health behaviors, and therefore, exclusion of these populations may be ethically and practically untenable. Acknowledging that lower follow-up rates may result, further research on different contact methods such as e-mail, web-based format, social networking, and text messaging should be considered.

Overall, these results suggest that the results of the primary study have reduced applicability to younger, male, and drug abusing populations, which are known to have higher smoking rates and are also most recalcitrant. The primary data analyses will likely need to impute smoking status for those lost to follow-up. Interestingly, variables related to the primary study purpose of smoking cessation, such as smoking rate and motivation to change were not associated with successful contact rates. Thus, concerns about missingness being meaningfully related to smoking behavior, and consequently introducing a critical bias in our interpretations about smoking patterns, are lessened. Additionally, amount of contact information (e.g., number and types of phone numbers, alternate contact people) were not associated with successful follow-up. Although significant effort is made to collect these data in longitudinal studies, their impact on follow-up rates may not be large. This finding merits further investigation.

The present study used multiple time points over 6 months, which allowed assessment of attrition over time. With this analysis, we found that 24% of participants that were not contacted at 2 weeks were successfully contacted at 3 months, and 21% that were not contacted at 3 months were successfully contacted at 6 months. These rates were comparable to those that crossed over from successful to

unsuccessful contact between the time points (19% and 22%, respectively). Also, nearly one in five participants that appeared lost to follow-up with unsuccessful contact at 2 weeks and 3 months were successfully contacted at 6 months. These results collectively suggest that serial follow-up is a dynamic process that involves more than just fixed participant baseline characteristics. They also suggest that two unsuccessful contacts are insufficient to establish futility, since future contact still appears possible.

LIMITATIONS

The data were collected only on current smokers in the ED for a research application. Consequently, the results should be generalized with caution for research in other ED patient populations and other medical settings. Additionally, these results in research study context should not be generalized to follow-up for clinical care, since the purposes of these contacts are very different. Additional work replicating our results across different patient populations and other settings is needed. Although recruitment at 10 geographically diverse EDs is a strength of this study, all sites were urban, academic centers and this limits the generalizability to community or rural EDs. Care should also be taken when comparing these results with studies using a different procedure for selecting patients with limited contact information, collecting contact information, and obtaining follow-up. These procedures may affect success rates and the characteristics associated with success.³² Specifically, potential subjects were aware of the financial incentive to participate in the study at the time of consent, which may have created an enrollment bias. The sample size for this study was relatively modest which may have obscured actual differences (i.e., Type II error). However, the larger and clinically significant differences in successful follow-up contact rates were likely identified.

CONCLUSIONS

In our study of ED patients that currently smoke, successful contact 2 weeks after the ED visit was 72% and decreased by 6 months to 58%, despite modest financial incentives. This may reflect the difficulty in obtaining follow-up in ED-based studies on substance abuse. Variables related to smoking cessation (e.g., cigarette pack-years, readiness to quit) and amount of contact information provided were not associated with successful contact. Successful follow-up for research is challenging, but our models indicate that older, female, and non-drug abusing participants are the most likely to be contacted. Surprisingly, non-response at earlier timepoints did not necessarily infer long-term loss to follow-up. Strategies to optimize longitudinal follow-up rates, with limited sacrifice of generalizability, remain an important challenge for ED-based research, particularly for studies on substance abusers and other difficult-to-reach populations.

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