Brief Report

Evaluation of a Systems-Based Tobacco Cessation Program Using Bedside Volunteers

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Abstract

Introduction: Hospitalization and post-discharge provide an opportune time for tobacco cessation. This study tested the feasibility, uptake, and cessation outcomes of a hospital-based tobacco cessation program, delivered by volunteers to the bedside with post-discharge referral to Quitline services. Patient characteristics associated with Quitline uptake and cessation were assessed.

Methods: Between February and November 2016, trained hospital volunteers approached inpatient tobacco users on six pilot units. Volunteers shared a cessation brochure and used the ASK-ADVISE-CONNECT model to connect ready to quit patients to the Delaware Quitline via fax-referral. Volunteers administered a follow-up survey to all admitted tobacco users via telephone or email at 3-months post-discharge.

Results: Of the 743 admitted tobacco users, 531 (72%) were visited by a volunteer, and 97% (531/547) of those approached, accepted the visit. Over one-third (201/531; 38%) were ready to quit and fax-referred to the Quitline, and 36% of those referred accepted Quitline services. At 3 months post-discharge, 37% (135/368) reported not using tobacco in the last 30 days; intent-to-treat cessation rate was 18% (135/743). In a multivariable regression model of Quitline fax-referral completion, receiving nicotine replacement therapy (NRT) during hospitalization was the strongest predictor (odds ratios [OR] = 1.97; 95% confidence interval [CI] = 1.34 to 2.90). In a model of 3-month cessation, receiving Quitline services (OR = 3.21, 95% CI = 1.35 to 7.68) and having coronary artery disease (OR = 2.28; 95% CI = 1.11 to 4.68) were associated with tobacco cessation, but a volunteer visit was not.

Conclusions: An “opt-out” tobacco cessation service using trained volunteers is feasible for connecting patients to Quitline services.

Implications: This study demonstrates the feasibility of a systems-based approach to link inpatients to evidence-based treatment for tobacco use. This model used trained bedside volunteers to connect inpatients to a state-funded Quitline after discharge that offers free cessation treatment of telephone coaching and cessation medications. Receiving NRT during hospitalization positively impacted Quitline referral, and engagement with Quitline resources was critical to tobacco abstinence post-discharge. Future work is needed to evaluate the cost-effectiveness and sustainability of this volunteer model.

Introduction

The hospital setting is an opportune time to help patients quit tobacco. A smoke-free environment and avoiding another adverse medical event can motivate patients to quit.¹ Hospital-initiated interventions that include supportive contact for at least 1 month post-discharge increase cessation rates by 37% at 6–12 months.² Translating these findings into feasible and effective models in real-world settings is an essential next step prior to implementation.³

Quitlines can support the continuum of care for discharged tobacco users by providing free telephone coaching and cessation medication, yielding 6-month quit rates of 30%.⁴ However, only 1% of tobacco users use Quitlines.⁴ The Consortium of Hospitals to Advance Research on Tobacco (CHART) studies reported mixed results on effectiveness of Quitline fax-referral^{5–10} and concluded that engaging tobacco users in post-discharge treatment is a challenge.³

We implemented and evaluated a systems-based approach for inpatient tobacco cessation that utilized trained bedside volunteers with the goals of Quitline referral and tobacco cessation. While volunteers have been used in the community^{11,12} and post-discharge settings,^{13,14} this is the first study using bedside volunteers to connect inpatient tobacco users to the Quitline. Study objectives were to (1) describe the feasibility, uptake, and cessation of using volunteers to implement the program and (2) identify patient characteristics of Quitline fax-referral completion and cessation in this sample of hospitalized tobacco users.

Methods

Design and Setting

This was a prospective study of an “opt-out” tobacco cessation program in six inpatient units (four cardiac, one stroke, and one medical) within one large hospital between February and November 2016. A part-time, hospital-funded, master’s-level project manager managed the study, coordinated volunteers, and completed bedside visits and follow-up calls when needed. Potential volunteers were recruited through hospital Volunteer Services from the community and local universities using social media, local news outlets, and health fairs. Interested adults (>18 years) who were non-tobacco users completed an interview with hospital Volunteer Services. Selected volunteers completed Confidentiality, Security and Ethics Agreements, and Communicable Disease Verification and Immunization Records. They were vetted through adult and child protection registries and had criminal background checks. Volunteers did not have education level prerequisites.

Volunteer training included a 2-hour New Volunteer Orientation on patient experience, confidentiality and Health Insurance Portability and Accountability Act (HIPAA), infection prevention, fire and public safety, and policies and procedures. Following these general trainings, bedside volunteers attended a 2-hour didactic training on the study procedures and the Delaware Quitline program. The project manager provided up to 6 hours of hands-on training on interacting with patients, program documentation, and fax-referral. In total, volunteers received approximately 8 hours of training.

Procedures

Volunteers received a daily list of tobacco users admitted in the last 24 hours. Tobacco use was based on admission documentation (Meaningful Use Core Measure 9: Record Smoking Status). On admission, all tobacco users are offered nicotine replacement therapy (NRT, ie, nicotine patch); the patient’s nurse contacts the provider to place the order for patients who accept the offer.

Prior to visiting an inpatient tobacco user, volunteers contacted the nurse to ensure appropriateness for a visit. Patients with altered mental status or those in isolation (per hospital policy) were not visited. If a patient was unavailable (ie, at testing, intubated), the volunteer attempted to visit the next day. If a patient refused the visit (“opted-out”), no further attempts were made. Readmitted patients who reported using tobacco were eligible to be visited again.

Volunteers used scripted messaging (see [Supplementary File](#)) utilizing the ASK-ADVISE-CONNECT model (ASK about tobacco use, ADVISE to quit, and CONNECT to resources) to engage patients.¹⁵ If the patient was not ready to quit, the volunteer left a brochure and encouraged calling the Quitline when ready. If the patient was ready to quit in the next 30 days, the volunteer described the Quitline’s free services and offered connection by filling out the fax-referral form.

Volunteers faxed completed referral forms to the Quitline daily. The Quitline called the patient within 72 hours post-discharge to offer free counseling and one of seven FDA-approved cessation medications. Volunteers surveyed all patients (even if patient refused or was discharged before a visit) via telephone or email at 3 months post-discharge to assess tobacco use, and quitting intention and behavior.

Only Delaware residents were eligible for Delaware Quitline services and included in the current study. Non-Delaware residents were provided the national Quitline number.

Measures

Program feasibility was assessed by volunteer and patient-based metrics. From the volunteer perspective, the number of volunteers trained, the total number of hours spent visiting patients and conducting follow-up calls, and time spent per patient were calculated. Patient-based metrics include the number of admitted tobacco users, the number who were approached, the number and proportion who were visited, and the proportion of those who were approached who accepted the visit.

Program uptake was determined by the number of patients referred to the Quitline and the proportion who accepted Quitline services.

3-month tobacco cessation was measured using the self-reported 30-day point prevalence abstinence assessed 3-months post-discharge. The proportion of self-reported abstainers from tobacco to those reached and to the full sample of admitted tobacco users (intent to treat) were assessed.

Four data sources were utilized:

Electronic Medical Records

The electronic medical record provided patient characteristics (gender, age, race, ethnicity, and primary insurance) and visit information (body mass index, Elixhauser comorbidities [a list of comorbidities identified from discharge diagnoses codes],¹⁶ discharge location, and length of stay). A composite coronary artery disease variable was created (combination of discharge diagnoses for stroke, angina, myocardial infarction), as this study included several cardiovascular units. Mortality information came from the Social Security Death Index and electronic medical record for in-hospital death.

Bedside Encounter Form

Information about the volunteer’s visit, including patient contact information, state of residence, quit attempts, readiness to quit (measured on a 4-item scale), completion of referral form, and time spent with patient, was captured by the volunteer on a structured REDCap (Research Electronic Data Capture) form.¹⁷

Follow-up Survey

At 3 months post-discharge, another REDCap survey captured frequency of tobacco use in past 30 days,¹⁸ readiness to quit,¹⁹ and quit attempts made since discharge.¹⁹

Delaware Quitline Reports

Participant outcome reports provided information about whether a patient was successfully contacted and accepted Quitline services.

Statistical Analysis

Continuous variables were summarized using means and standard deviations, or median and interquartile range according to distribution; percentages and frequencies were generated for categorical data. Population characteristics were compared between those referred and not-referred to the Quitline and between those who stopped using tobacco and those who did not, using non-parametric Wilcoxon rank sum tests for continuous variables and chi-squares for categorical variables.

Multivariable logistic regression models were used to examine the association between patients' characteristics and the following dependent variables: completing a Quitline fax-referral and quitting tobacco. Variables included in the final model were selected on the basis of bivariate model analysis with p value of $\leq .05$ and importance from other studies. Odds ratios (OR) and corresponding 95% confidence intervals for the parameters were estimated; $p \leq .05$ was

the threshold for statistical significance. All analyses were performed using SAS 9.4 (SAS Institute Inc, Cary, NC).

Results

Program Feasibility

Twelve volunteers were recruited. In total, volunteers spent 391 hours visiting patients and conducting follow-up calls over the 10-month period. Each volunteer spent an average of 4.4 minutes per patient (median = 4; range = 0–30). The study spanned 267 days (including weekends). Volunteer coverage was not available on 98 (37%) of the study days; on these days, the project manager visited patients.

Between February and November 2016, 743 tobacco users were identified at admission. A total of 531 (72%) were visited by a volunteer, and 97% of those approached, accepted the visit (531/547) (see [Supplementary Table 1](#)).

Quitline Uptake

Of the 531 patients who completed a visit with the volunteer, 201 (38%) were ready to quit in the next 30 days and fax-referred to the Quitline; 36% of those accepted services from the Quitline. In bivariate models, patients who were black, those who requested NRT, and those who received NRT during hospitalization were significantly more likely to have a fax-referral completed for Quitline

Table 1a. Patient Characteristics by Quitline Referral Completion

	Quitline referral completed $n = 201$	Quitline referral not completed $n = 330$	p value
Male, n (%)	115 (57.21)	183 (55.45)	.69
Age, mean (SD)	54.85 (12.06)	57.10 (13.70)	.05
Race			<.0001
Black, n (%)	67 (33.33)	51 (15.45)	
White, n (%)	130 (64.68)	270 (81.82)	
Other, n (%)	4 (1.99)	9 (2.73)	
Hispanic, n (%)	6 (2.99)	10 (3.03)	.97
Primary insurance			.87
Medicaid, n (%)	62 (30.85)	101 (30.61)	
Medicare, n (%)	87 (43.28)	137 (41.52)	
Other, n (%)	52 (25.87)	92 (27.88)	
BMI (mean, median, IQR)	31.20, 29.96, 24.64–36.02	29.82, 27.97, 23.70–32.77	.01
Comorbidity count (mean, median, IQR)	5.95, 5.0, 3–9	5.66, 5.0, 2–8	.31
CHF, n (%)	43 (21.39)	57 (17)	.25
COPD, n (%)	102 (50.75)	139 (42.12)	.05
Depression, n (%)	82 (40.80)	131 (90.70)	.80
Psychiatric issue, n (%)	48 (23.88)	66 (20.00)	.29
CAD (stroke, angina, myocardial infarction), n (%)	26 (12.94)	37 (11.21)	.55
PVD, n (%)	52 (25.87)	83 (25.15)	.85
Diabetes, n (%)	73 (36.32)	99 (30.00)	.13
Cancer, n (%)	26 (12.94)	54 (16.36)	.28
Ulcer, n (%)	20 (9.95)	30 (9.09)	.74
Drug or alcohol disorder, n (%)	68 (33.83)	114 (34.55)	.87
Requested NRT at any visit	104 (51.74)	104 (31.52)	<.0001
Received NRT at any visit	99 (49.25)	110 (33.33)	.0003
Patient readiness to quit			<.0001
Not thinking about quitting	2 (1.00)	176 (53.33)	
Thinking of or is actively quitting	189 (94.03)	134 (40.61)	
Missing value	10 (4.98)	20 (6.06)	

BMI = body mass index; CAD = coronary artery disease; CHF = congestive heart failure; COPD = chronic obstructive pulmonary disease; NRT = nicotine replacement therapy; PVD = peripheral vascular disease; SD = standard deviation.

Table 1b. Characteristics Independently Associated With Quitline Referral Completion

Characteristics ^a	Odds ratio	95% Confidence interval
Male vs. Female	0.94	0.64 to 1.40
Age	1.00	1.00 to 1.00
Primary insurance, Medicaid vs. Other	1.36	0.79 to 2.34
Primary insurance, Medicare vs. Other	0.88	0.53 to 1.46
BMI	1.00	0.99 to 1.01
Comorbidity count	1.00	0.95 to 1.04
CAD (stroke, angina, myocardial infarction)	1.48	0.81 to 2.71
Received NRT at any visit	1.97	1.34 to 2.90

BMI = body mass index; CAD = coronary artery disease; NRT = nicotine replacement therapy.

^aCharacteristics that were statistically different ($p \leq .05$) between those who had a Quitline referral completed and those who did not.

services (see Table 1a). In a multivariable regression model, receiving NRT during hospitalization doubled the odds of fax-referral completion (see Table 1b).

3-Month Tobacco Cessation

All 743 admitted tobacco users were sent a 3-month follow-up survey; 368 completed the survey, 356 did not, and 19 patients died (see Supplementary Table 2 for patient characteristics associated with survey completion). Of the 368 patients who completed the survey, 135 (37%) self-reported cessation, representing 18% of the study population (135/743). Patient factors associated with stopping tobacco in bivariate analysis included older age, coronary artery disease, and accepting Quitline services. There were no significant differences in cessation by volunteer visit and receipt of NRT during hospitalization (see Table 2a). The regression model of 3-month cessation showed that coronary artery disease more than doubled the odds and receiving Quitline services more than tripled the odds of cessation (see Table 2b).

Table 2a. Patient Characteristics by Tobacco Cessation at 3-Month Follow-up

	Stopped using tobacco, $n = 135$	Did not stop using tobacco, $n = 233$	p value
Male, n (%)	88 (65.19)	131 (56.22)	.09
Age, mean (SD)	59.53 (12.13)	57.12 (12.58)	.03
Race, n (%)			.23
Black	34 (25.19)	68 (29.18)	
White	100 (74.07)	158 (67.81)	
Other	1 (0.74)	7 (3.00)	
Hispanic, n (%)	3 (2.22)	7 (3.00)	.66
Primary insurance, n (%)			.06
Medicaid	26 (19.26)	62 (26.61)	
Medicare	68 (50.37)	100 (42.92)	
Other	41 (30.37)	71 (30.47)	
BMI (average, Median, IQR)	29.66, 28.62, 25.38–35.07	29.57, 28.13, 23.71–34.15	.45
Comorbidity count (average, Median, IQR)	5.24, 4, 2–8	5.73, 5, 2–9	.17
CHF, n (%)	28 (20.74)	52 (22.32)	.72
COPD, n (%)	48 (35.56)	118 (50.64)	.01
Depression, n (%)	38 (28.15)	85 (36.48)	.10
Psychiatric issue, n (%)	17 (12.59)	49 (21.03)	.04
CAD (stroke, angina, heart attack), n (%)	22 (16.30)	22 (9.44)	.05
PVD, n (%)	36 (26.67)	62 (26.61)	.99
Diabetes, n (%)	41 (30.37)	84 (36.05)	.27
Cancer, n (%)	23 (17.04)	39 (16.74)	.94
Ulcer, n (%)	18 (13.33)	23 (9.87)	.31
Drug or alcohol disorder, n (%)	29 (21.48)	76 (32.62)	.02
Requested NRT at any visit, n (%)	45 (33.33)	80 (34.33)	.85
Received NRT at any visit, n (%)	40 (29.63)	74 (31.76)	.67
Visited by a volunteer, n (%)	104 (77.04)	168 (72.10)	.30
Quitline referral completed, n (%)	89 (65.93)	171 (73.39)	.13
Patient readiness to quit at hospital visit ^a , n (%)			.09
Not thinking about quitting	24/104 (23.08)	59/168 (35.12)	
Thinking of or is actively quitting	72/104 (69.23)	101/168 (60.12)	
Missing	8/104 (7.69)	8/168 (4.76)	
Patient readiness to quit from survey, n (%)			
Yes, actively quitting		18 (8.00)	
Yes, in the next 30 days		28 (12.44)	
Yes, in the next 6 months		84 (37.33)	
No, not thinking about quitting		95 (42.22)	
Serious attempt to quit since discharge, n (%)		90 (40.00)	
Accepted services from Quitline, n (%)	25 (18.52)	17 (7.30)	.001

BMI = body mass index; CAD = coronary artery disease; CHF = congestive heart failure; COPD = chronic obstructive pulmonary disease; NRT = nicotine replacement therapy; PVD = peripheral vascular disease; SD = standard deviation.

^aThis variable was collected during the volunteer encounter. As not all patients had a volunteer encounter, the denominators were altered for this variable.

Table 2b. Characteristics Independently Associated With Tobacco Cessation at 3-Month Follow-up

Characteristics ^a	Odds ratio	95% Confidence interval
Male vs. Female	1.32	0.82 to 2.13
Age	1.01	0.99 to 1.04
Primary insurance, Medicaid vs. Other	0.97	0.51 to 1.85
Primary insurance, Medicare vs. Other	0.60	0.31 to 1.15
BMI	1.00	0.98 to 1.01
Comorbidity count	0.96	0.90 to 1.01
CAD (stroke, angina, myocardial infarction)	2.28	1.11 to 4.68
Received NRT at any visit	0.81	0.48 to 1.36
Quitline referral completed	1.00	0.53 to 1.88
Accepted services from Quitline	3.21	1.35 to 7.68

CAD = coronary artery disease, NRT = nicotine replacement therapy.

^aCharacteristics that were statistically different ($p \leq .05$) between those who stopped using tobacco and those who did not.

Discussion

The purpose of this study was to describe the feasibility, uptake, and cessation of a volunteer-based inpatient tobacco cessation program. The main finding from this evaluation was that using volunteers is a feasible approach to reaching inpatient tobacco users as shown by 72% of inpatient tobacco users who were visited, and 97% that accepted the visit. The second main finding was that receiving NRT during hospitalization doubled the odds of completing a fax-referral to the Quitline. While receiving a visit from a volunteer and completing a Quitline fax-referral were not associated with post-discharge cessation, accepting Quitline services tripled the odds of quitting. Together, these data provide empirical support for the feasibility of using hospital-based volunteers, and the importance of providing inpatient NRT, and engagement with Quitline services to support cessation post-discharge.

While many studies have used research or healthcare staff to deliver inpatient cessation interventions,² this is one of the first to use trained bedside volunteers. With a brief volunteer visit, 38% of patients were referred to the Quitline, of which 36% accepted services, which is similar to other Quitline referral studies using a warm-handoff, faxed Quitline referral, or brief telephone intervention.^{9,10,20}

Patients who received NRT during hospitalization were twice as likely to accept a Quitline referral, while receiving Quitline services tripled the odds of a patient reporting not using tobacco 3 months following discharge. These data converge with previous studies demonstrating the effectiveness of Quitlines in helping patients make a quit attempt,²¹ more intensive inpatient tobacco cessation programs,² and community-based programs using volunteer referrals to cessation services.^{11,20} A real-world setting allowed us to show the positive effect of receiving NRT during hospitalization on acceptance of a referral to a treatment program post-discharge. It may be that patients who have a positive experience with NRT during hospitalization are more willing to continue NRT and maintain abstinence post-discharge; the Delaware Quitline provides free NRT and support to do just that.

Limitations

A potential drawback to the program model we employed is that it takes a considerable amount of time to recruit and train volunteers

(~8 hours per volunteer) and also requires paid staff time to support any gaps in volunteer coverage. The volunteer's primary task at the bedside is to get patients connected to the Quitline via fax-referral, but only a minority of patients complete the fax-referral. While other more efficient methods of referring patients to the Quitline may be available, our goal was to use our existing volunteer resources in a unique way to encourage tobacco cessation.

The results of this study should be interpreted with consideration of some limitations. Because of the non-randomized design, causality could not be assessed; patients could have quit tobacco based on other factors. Additionally, the Delaware Quitline only provided data on patients who were referred through our program; if the patient contacted the Quitline themselves or was referred elsewhere, these data were not available. Lastly, self-reported tobacco cessation was not confirmed biochemically.

In conclusion, an "opt-out" tobacco cessation service using trained volunteers is feasible for connecting patients to Quitline services. However, a volunteer visit was not associated with quitting at 3 months post-discharge. Receiving NRT during hospitalization positively impacted Quitline referral, and engagement with Quitline resources was critical to tobacco abstinence post-discharge. Future work is needed to evaluate the cost-effectiveness and sustainability of this volunteer model.

Supplementary Material

Supplementary data are available at *Nicotine and Tobacco Research* online.

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Declaration of Interests

FP receives free study medication from Pfizer.

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