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Association Between Utilization of Quitline Services and Probability of Tobacco Abstinence in Low-Income Smokers

Steven L. Bernstein, MD^{a,c,d}, June-Marie Rosner, MA, Med^{a,d}, Benjamin Toll, PhD^{b,c,d,e,f}, and Susan M. Zbikowski, PhD^g

^aDept. Of Emergency Medicine, New Haven, CT

^bDept. of Psychiatry, New Haven, CT

^cYale Comprehensive Cancer Center, New Haven, CT

^dYale School of Medicine, New Haven, CT

^eMedical University of South Carolina

^fHollings Cancer Center

^gAlere Wellbeing, Inc., Seattle, WA

Abstract

Introduction—Quitlines (QL) are an effective means for smoking cessation, but a paucity of data exist examining the dose-response relationship between use of QL services and quit rates, especially among low-income smokers. The purpose of this study was to study the relationship between tobacco abstinence and use of QL services among low-income smokers.

Methods—Secondary analysis of a randomized trial of every- or some-day smokers age 18 years or older visiting an urban Emergency Department. Inclusion criteria included self-pay or Medicaid insurance, as a proxy for low-income and low socioeconomic status. Intervention participants received a motivational interview, 6 weeks of nicotine patches and gum, a referral faxed to the state-sponsored QL, a booster call, and a quitline brochure. Control participants received the brochure. Smoking status was assessed by phone at 1 and 3 months, with confirmation via exhaled carbon monoxide testing at 3 months for those reporting abstinence. QL usage was obtained by utilization data from the QL database.

Results—Of 778 subjects, 197 (25.3%) reported any use of QL services at 3 months. Participants were trichotomized: no QL usage, 1 call only, and >1 call (583, 99, and 98 participants, respectively). Quit rates at 3 months in these no, low-, and high-use groups were, respectively, 7.2%, 9.1%, and 15.3% ($P=0.03$). Participants who used the QL had a median of 28 total minutes of telephone contact.

Address for correspondence: Steven L. Bernstein, MD, Department of Emergency Medicine, Yale School of Medicine, 464 Congress Ave., Suite 260, New Haven, CT 06519, 203-737-3574, Steven.bernstein@yale.edu.

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Conclusion—Among low-income smokers, greater use of QL services is associated with higher abstinence. Whether this resulted from a direct effect of the QL, or greater motivation among smokers using QL services cannot be determined from these data.

Keywords

smoking cessation; quitlines; tobacco abstinence

1. Introduction

Quitlines (QL) are effective and cost-effective means to help people quit smoking (S. H. Zhu et al., 2002). Quitlines are free phone-based services that provide confidential, tailored counseling to tobacco smokers. They are available throughout North America and other parts of the world. In all 50 of the United States, Washington, D.C., and Guam a unified phone number, 1-800-QUIT-NOW, connects callers to the a free, publicly available quitline from the state in which the call was placed. They have been endorsed as effective by the US Public Health Service and the Institute of Medicine, and a recent Surgeon General's report (Bonnie, Stratton, & Wallace, 2007; Fiore et al., 2008; U.S. Department of Health and Human Services, 2014).

Despite their availability and effectiveness, quitlines are relatively underutilized. About 1% of smokers use quitlines annually, although results vary by state.(Cummins, Bailey, Campbell, Koon-Kirby, & Zhu, 2007)

There is a paucity of research exploring the impact of quitline exposure on outcomes for low-income smokers. In one large-scale study of 3030 callers from San Diego, California, of whom 57% were female, 81% were white, and 60% had 12 or more years of education, the 12-month self-reported quit rates were, for control, one-call, and multi-call arms, respectively, 5.4%, 7.5%, and 9.9% ($P<0.001$) (S.-H. Zhu et al., 1996). A study of 7600 quitline callers in Montana, most of whom were white and had some college education, found that older age and a greater number of quitline calls were independently associated with self-reported abstinence at 6 months (Biazzo et al., 2010). A population-based study of 1334 largely white callers to the Oregon quitline found that, after adjusting for race, education, and insurance, the number of calls to the quitline was not associated with increased odds of self-reported abstinence (Ay El-Bastawissi et al., 2003).

A recent Cochrane review of 77 trials involving quitlines found mixed evidence of a dose-response relationship (Stead, Hartmann-Boyce, Perera, & Lancaster, 2013). One or two brief calls appear less likely to lead to sustained tobacco abstinence than three or more calls, although the evidence is inconclusive. And the incremental benefit of adding telephone services to pharmacotherapy is less than adding phone counseling to print materials or a brief counseling intervention.

The studies in the Cochrane meta-analysis generally used participant self-report to assess smoking status post-intervention. A smaller number of studies attempted biochemical validation, but many had large proportions of participants who self-reported tobacco abstinence by phone, but did not provide a sample for biochemical verification. An

assessment of the dose-response relationship between use of QL services and biochemically confirmed quit rates with a high response rate has not, to our knowledge, been conducted previously. Nor has the existence of a dose-response relationship between QL use and tobacco abstinence been explored specifically for low-income smokers, who comprise a disproportionate share of tobacco users.

The objective of this study was to examine the relationship between tobacco abstinence and intensity of use of QL services among low-income adult smokers enrolled in a clinical trial.

2. Methods

This study was a secondary analysis of a two-arm randomized clinical trial of low-income individuals age 18 years or older affirming every or some-day smoking visiting a busy urban Emergency Department in the northeastern US. Main results from the study have already been reported.(Bernstein et al., 2015)

This study was conducted from October 2010 to December 2012, in the adult emergency department (ED) of a university hospital in an urban area in the northeastern United States. Eligible participants were aged 18 years or older, English-speaking, endorsing smoking every or some days with lifetime consumption of at least 100 cigarettes, and presenting with any non-psychiatric problem. As a proxy for low-income, all subjects were either uninsured or insured by Medicaid. Consenting individuals were randomized to 1 of 2 arms: usual care, in which participants were provided with a brochure, prepared by the QL, that included the QL phone number and services provided, and enhanced care, in which participants were provided with the brochure, a motivational interview by a trained research assistant, 6 weeks of both nicotine patches and gum tailored to daily consumption, a proactive referral (described in detail below) to the state smokers' quitline, and a booster phone call made by a study nurse 2–3 days after enrollment. All participants were contacted by phone 1, 3, and 12 months after enrollment. Participants endorsing tobacco abstinence at 3 months were asked to return to the hospital for a measurement of exhaled carbon monoxide to verify abstinence. Participants unable to return were met by a study assistant at a public location nearby. At each wave of follow-up, participants were led through a Treatment Services Review to assess use of all healthcare services, including the quitline.

Additionally, actual enrollment and utilization data was obtained from the QL. Data included whether the participant was reached, the number of phone sessions, the duration of each call, whether additional services or calls were accepted, and whether the participant was mailed starter packets of nicotine replacement therapy.

Participants lost to follow-up were considered to be smoking.

2.1 Description of Quitline Services

The proactive referral entailed the research associate (RA) directly faxing the referral form to the QL. The referral form included the patient's contact information. The QL services, which were free to residents in CT, were operated by Alere Wellbeing (based in Seattle, Washington) and funded by the state Department of Public Health.

Services include one-on-one phone-based coaching with a trained tobacco cessation specialist (up to 5 calls), a printed quit guide, online educational content and tracking tools, and referral to additional community-based services. In addition, participants are screened for medication contraindications, receive assistance choosing an appropriate medication, and receive advice regarding medication use and managing side-effects. During this study, participants were eligible to receive 2–8 weeks of nicotine patches, in addition to the 6 weeks of patches and gum provided by the ED. In 2012, the QL also offered a SMS texting program for QL users who were interested in this service.

Calls are scheduled at convenient times for the caller and at relapse-sensitive intervals: assessment and planning, quit date call, quit date follow-up (7 days after the quit date call) and two additional calls (approximately three weeks after the previous call). The first call (assessment and planning) typically lasts 25–30 minutes, with subsequent sessions lasting for 10–15 minutes each. Participants also can call the quitline as needed for additional support between proactive calls.

All participants who were fax-referred were contacted by quitline staff within 48 hours; services were described and participants were given the opportunity to enroll in services. The quitline faxed a follow-up report back to study personnel. If the quitline was able to contact the participant, the report included data on counseling duration and provision of medication. Investigators were also notified if the QL was unable to reach the participant.

The behavioral support is grounded in social cognitive theory (Bandura, 1977, 1986) and incorporates the strategies for effective tobacco dependence treatment outlined in the US Public Health Service Clinical Practice Guideline (Fiore et al., 2008). Coaches use cognitive behavioral counseling techniques and motivational interviewing. The effectiveness of the program has been demonstrated in three randomized trials (Hollis et al., 2007; Orleans et al., 1991; Swan et al., 2003) and in several real world evaluations (Curry, Grothaus, McAfee, & Pabiniak, 1998; A. El-Bastawissi et al., 2003; Ringen, Anderson, McAfee, Zbikowski, & Fales, 2002).

During the initial registration/counseling call, staff assess each caller's tobacco use, nicotine dependence, quit history, motivation and self-efficacy. The information collected is used to develop a tailored treatment plan. Once enrolled, callers are connected with a Quit Coach who assesses readiness to quit (only those participants ready to set a quit date within 30 days are recommended for the multiple call program), and the preferences of the caller.

2.2 Data analysis

Data at the 1, 3, and 12 month follow-ups were recorded on paper-and-pencil machine-readable forms and scanned into a Microsoft Excel database. Data were then exported into SPSS 19.0, which was used for all analyses. Univariate data are reported with parametric and nonparametric statistics, as appropriate. Categorical data are compared with chi-square tests, continuous data with the z-test. A logistic model was fitted to assess the effect of QL use on abstinence, independent of treatment assignment. Covariates fitted in the model included age, sex, and race. Covariates were chosen on clinical grounds. Regression

diagnostics were performed, including a goodness-of-fit test and test for model variance. All inferential testing was two-sided, and alpha was set at 0.05.

The study was approved by the Human Investigation Committee of (blinded) University. The trial was registered with www.clinicaltrials.gov and has Identifier NCT01328431.

3. Results

From October 2010 to December 2012, 778 participants were enrolled in the study, of whom 770 (99%) had QL data available at 3 months, either by self-report or QL records. Of all participants, the mean age was 40.5 years, and 371 (47.7%) were male. The distribution of race, ethnicity, insurance, education, and other demographics are provided in Table 1. More than half the sample was African-American or Hispanic, and more than three-fourths had no more than a high school education. Of all participants, 197 (25.3%) reported any use of QL services.

In the Usual Care condition, 84 of 390 participants (21%) called the QL to inquire about services. Of these participants, 73 (18%) received QL services, of whom 71 (18%) were transferred to the five-call program. In the Intervention condition, of 386 participants referred to the QL, 195 (51%) accepted services. Of these participants 124 (32%) received QL services, of whom 104 (27%) were transferred to the five-call program. Figure 1 shows the use of QL services by all participants in the study.

The distribution of participants' engagement with the QL suggested a natural partitioning into three groups no QL usage, 1 call only, and >1 call, as shown in Table 2.

The carbon monoxide-confirmed quit rates at 3 months in these no-, low-, and high-use groups were, respectively, 7.2%, 9.1%, and 15.3% (583, 99, and 98 participants, $P=0.03$). Participants who used the QL had a median of 28 total minutes of telephone contact (range 0–143, IQR 17, 48 minutes). Similarly, participants were trichotomized by minutes of QL contact: 0, 1–27, and 28–143 minutes, with respective quit rates of 7.2%, 11.2%, and 13.1% (583, 98, and 99 participants, $P=0.09$). Of note, 94% of all participants endorsing tobacco abstinence by phone at 3 months returned to the ED for biochemical confirmation.

After controlling for group assignment, age, sex, race and ethnicity, the number of quitline calls was an independent predictor of biochemically confirmed tobacco abstinence at 3 months, as shown in Table 3. Group assignment was associated with improved odds of tobacco abstinence as well. The model showed reasonable goodness-of-fit, with a Hosmer-Lemeshow statistic of 0.23, and reasonable variance, with a Nagelkerke R^2 of 0.08.

As a sensitivity analysis, we reran the model, including subject self-reported any use of nicotine gum or patch at 3 months. Group assignment and QL utilization remained statistically significant, with ORs of, respectively, 2.21 (95% CI 1.17, 4.15), and 1.49 (95% CI 1.07, 2.08). Use of NRT was not associated with quitting (OR 0.64, 95% CI 0.34, 1.21).

4. Discussion

We found a dose-response relationship between the number of QL calls and biochemically verified 3-month abstinence, in a cohort of low-income smokers, racially and ethnically diverse, most of whom have no more than a high school education. Analyzing the data by total number of minutes did not yield a statistically significant result, although the direction of the association is the same as that for number of calls. To our knowledge, this is the first study to examine specifically the dose-response relationship between use of quitline services and tobacco abstinence, using biochemical confirmation, in this population.

This dose-response relationship suggests that the QL was able to enhance smokers' motivation sufficiently to make a successful quit attempt, and remain abstinent from tobacco by the study's primary endpoint assessment at 3 months. Provision of starter doses of nicotine replacement therapy, received by 143 (72.6%) of the 197 participants who called the QL, may have contributed to their successful quit attempt.

It is noteworthy that nearly 63% of the participants using the QL were randomized to the intervention arm. Participants in this arm were actively referred to the QL by study research assistants at the time of enrollment, by means of a form faxed to the QL from the ED. The QL then called these participants to perform the intake assessments and offer treatment. This is in contrast to participants randomized to the control arm, who received a brochure containing the QL phone number, but had to actively call the QL to request services. Nonetheless, 86 of 390 subjects (22%) of control subjects still called the QL. The latter result suggests that even low-income smokers are willing and able to contact the QL, if given an informational brochure.

The proportion of abstinent participants who used the QL, stratified by treatment condition, was comparable: 18/47 (38.3%) abstinence in intervention participants, and 6/19 (31.6%) abstinence in control participants ($P = 0.61$). Thus, the QL appears efficacious in control participants who actively self-referred. Reasons for the relatively high rate of use of QL services in the control condition are unclear. It may be that the ED visit, and discussing tobacco use with the research assistant during the informed consent process and baseline assessment, may have been sufficient to increase motivation to quit (McCambridge, Kypri, & Elbourne, 2014). We did not formally measure motivation.

Of note, we cannot make inferences about the direction of the association between QL use and tobacco abstinence. It is possible that the QL counseling enhanced participants' ability to be abstinent from tobacco at 3 months, as did the nicotine replacement medication and the motivational interview. Or, it may be that participants who were more motivated to quit were also more motivated to use QL services. We did not assess participants' motivation to change at baseline, nor at other timepoints during the study, and as such were not able to analyze participant motivation.

4.1 Limitations

This was a single-site study of smokers visiting an urban, northeastern U.S. hospital-based emergency department. All smokers were low-income, defined as having no insurance or

Medicaid. Whether these results generalize to other populations of smokers is unknown. To the extent that smokers today are disproportionately low-income, and our sample was racially and ethnically diverse, we believe our results are generalizable. In addition, we have no behavioral or biological reason to suspect that this dose-response relationship would not be found in other populations of smokers.

It is worth noting that the 99 subjects who had one call with the QL consisted of two distinct populations. The larger group (77 subjects, 78% of the total) were enrolled in the 5-call program, because they were willing to set a quit date. However, they only completed the initial call. The remaining 22 subjects (22%) were unwilling to set a quit date, and hence were offered only one call. Again, this did not affect the direction of the association between QL use and probability of quitting. It is possible that subjects who completed one call, irrespective of the QL program in which they were enrolled, had comparable levels of motivation to quit. Again, we did not perform a formal assessment of motivation.

There was one time increment for which we could not obtain data. Smokers who agree to initiate QL-based treatment are warm-transferred to a counselor, after the intake assessment is completed during the initial call. The smoker is typically placed on hold during that transfer. Time stamping is not performed by the QL for that period. Hence, we cannot include that time increment in our analyses. Conversations with QL staff and informal “secret shopper” calls by study research assistants suggest that time on hold is brief, likely 5 minutes or less in duration. Hence, that period on hold should not change our analysis substantively.

Lastly, in the parent trial, participants were randomized to treatment or no treatment. We did not randomize to different levels of QL service. This also limits our ability to make inferences about the relationship between intensity of QL services and abstinence.

5. Conclusion

A dose-response relationship existed between the number of calls to the QL and probability of tobacco abstinence at 3 months. The direction of the association remains unclear. The QL likely helped participants quit, although QL-using participants may be more motivated to quit. Quitlines appear to be an effective, cost-sensitive approach to help low-income smokers achieve tobacco abstinence.

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Highlights

- Low-income smokers are interested in seeking help with quitting tobacco from a free public resource (state QL)
- In this study, a secondary analysis of data from a randomized clinical trial of low-income smokers, we found a dose-response relationship between the quit rate and intensity of use of quitline services.
- In multivariable modeling, use of quitline services and group assignment were independent predictors of smoking abstinence.

Figure 1.

Figure 1a. Use of Quitline services by Intervention arm participants.

Figure 1b. Use of Quitline services by Control arm participants.

Table 1

Demographics of study participants.

Variable	No calls N=583	1 call N=99	>1 call N=98	P value
Male sex, N (%)	277 (47.7%)	49 (49.5%)	45 (45.9%)	0.88
Age, years, mean (SD)	40.1 (11.6)	42.0 (12.1)	41.6 (11.2)	0.17
Race, N (%)				0.22
White	228 (39.2%) 229 (38.4)	43 (43.4%)	34 (34.7%)	
African-American	121 (20.8)	41 (41.4)	38 (38.8)	
Hispanic	3 (0.5)	13 (13.18)	24 (24.5)	
Other		2 (2.0)	2 (2.0)	
Insurance				0.37
Medicaid	490 (84.0%) 93 (16.0)	79 (79.8%)	89 (90.8%)	
Self-pay		20 (20.2)	9 (9.2)	
Education				0.51
High school or less	439 (75.2%) 144 (24.8%)	79 (79.8%)	77 (78.6%)	
At least some college		20 (20.2)	21 (21.4)	
Cigarettes/day, mean, IQR	11 (8, 20)	11 (10, 20)	11 (7, 20)	0.18
Admitted, N (%)	171 (29.4%)	32 (32.3%)	28 (28.6%)	0.75
Assigned to intervention arm, N (%)	265 (45.6%)	69 (69.7%)	55 (56.1%)	<0.0001

Table 2

Quitline call duration, number of calls, and abstinence rate.

Abstinence	Number of calls		Total call duration, minutes			P value
	No calls (N=583)	1 call (N=99)	>1 call (N=98)	0 (N=583)	1-27 (N=98)	28-143 (N=99)
Biochemically confirmed abstinence at 3 months, N (%)	42 (7.2%)	9 (9.1%)	15 (15.3%)	42 (7.2%)	11 (11.2%)	13 (13.1%)
						0.09

Table 3

Logistic regression model for QL usage and abstinence at 3 months.

Variable	P value	OR	95% OR
Age	0.32	0.99	0.97, 1.01
Sex (male; female as referent)	0.19	0.71	0.41, 1.19
Race/Ethnicity (other race/ethnicity as referent)			
White	0.39	2.67	0.29, 24.77
African-American	0.89	1.17	0.13, 10.59
Hispanic	0.73	1.48	0.16, 13.77
Assigned to Intervention	0.001	2.63	1.50, 4.59
QL Call Group *	0.03	1.27	1.03, 1.58

* 0, 1, or >1 call, modeled as an ordinal variable