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RESEARCH ARTICLE

Long-term Quit Rates in Fax-Referred as Compared to Self-Referred Tobacco Quitline Registrants

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Introduction: To increase the use of quitlines for treating tobacco use and dependence, quitline referral interventions are recommended for healthcare systems and providers. Research is limited as to whether fax-referred smokers have quit outcomes similar to those of traditional self-callers to quitlines.

Methods: Oklahoma Tobacco Helpline registration data from March 2013 to October 2014 and 7-month follow-up data were used to compare hospital- and clinic-based fax-referred registrants (n=537) to self-callers (n=2,577). Contingency table chi-square tests and relative risks were used to identify differences in 30-day point prevalence abstinence at 7-month follow-up. Two-sided p-values <0.05 were considered statistically significant. Analyses were conducted in 2015.

Results: Fax-referred registrants versus self-callers were significantly more likely to be older (49.4 vs 47.6 years), white (70.6% vs 59.1%), non-Hispanic (96.8% vs 94.2%), and to have smoked fewer than one pack of cigarettes per day (54.0% vs 44.9%). Self-callers versus fax-referred registrants were significantly more likely to be uninsured (36.5% vs 29.4%) and have received nicotine-replacement therapy from the Helpline (92.3% vs 79.9%). At 7-month follow-up, a similar proportion of fax-referred registrants reported not using tobacco in the past 30 days as compared to self-callers (29.3% vs 31.8%, p=0.2945).

Conclusions: Although differences in sociodemographics, tobacco use behavior, and Helpline services were observed between fax-referred registrants and self-callers, quit outcomes at follow-up did not differ. This observational study has important implications for tobacco control initiatives as it shows patients fax-referred by hospitals and clinics to quitlines may be as successful as self-callers in quitting smoking.

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INTRODUCTION

It is well established that tobacco quitlines are an effective means for treating tobacco use and dependence.[1–6] There is evidence of their effectiveness even in populations that historically have been hard to reach.[7,8] However, only a small fraction, estimated at 1% (range, 0.01%–4.3%), of cigarette smokers utilize quitline services each year across the U.S.[9] Thus, much work is needed to increase the awareness and use of quitlines, both in the population overall and in high-risk groups, including individuals with high rates of tobacco-related diseases.[10]

To increase the use of tobacco quitlines, the Community Preventive Services Task Force recommends quitline referral interventions for healthcare systems

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and providers,[10] as healthcare encounters provide opportunities to reach and treat tobacco users. Referral systems have been cited as one intervention effective at increasing both the use of quitline services and the number of patients who successfully quit using tobacco products.[10] Currently, most health systems provider referrals to tobacco quitlines use the fax referral method.[11] A fax referral creates an opportunity for the healthcare provider to take action at the time of the patient encounter and removes the barrier of the patient having to initiate the first call to the quitline.[12]

The Oklahoma Tobacco Helpline was launched in 2003 by the Oklahoma Tobacco Settlement Endowment Trust.[13] The Helpline is operated by Alere Wellbeing, Inc., and provides free smoking-cessation telephone services, including counseling, mailed materials, and nicotine-replacement (NRT) therapy, to Oklahoma residents interested in quitting tobacco.[13] Specific programs have been developed to better serve the needs of priority populations, such as pregnant women and American Indians.[13] The Helpline's services are delivered in a manner consistent with best practices in quitline operations[14,15] and has ranked in the top 20% of all state quitlines for reach, investment, and quit rates since the inception of the North American Quitline Consortium's (NAQC) benchmarking activities.[13] Readiness to quit, participant preferences, and health insurance status determine the intervention received from the Helpline.[12] All uninsured tobacco users are eligible for the multiple call intervention and up to 8 weeks of NRT, whereas those with private insurance are eligible for the single-call program and 2 weeks of NRT.

In 2010, in response to the Community Preventive Services Task Force recommendation and the need to aid more tobacco users in quitting, the Oklahoma Hospital Association, Oklahoma Tobacco Settlement Endowment Trust Fund, and select hospitals partnered to integrate a sustainable tobacco-cessation protocol for all tobacco-using patients.[12] The initiative, "Hospitals Helping Patients Quit," is based on the 5A's treatment model outlined in the U.S. Public Health Service publication, *Treating Tobacco Use and Dependence: 2008 Update,*[1] endorsed by the Centers for Disease Control and Prevention. The initiative, initially implemented in 21 hospitals and 12 clinics in 2010, identifies and fax-refers tobacco users to the Oklahoma Tobacco Helpline for quit support.[12] When the Helpline receives the referral form, a Quit Coach attempts to call the patient within 48 hours.[12] A minimum of three attempts is made over the next 5 days and a letter is sent to the patient if not reached by phone.[12] After the first year of the initiative's launch, Helpline fax referrals increased by more than 100% and more than 40% of fax referrals successfully resulted in Helpline enrollment.[12]

Confirming previous studies of quitlines in other states,[16,17] the Oklahoma Tobacco Helpline's fax referral registrants were found to differ significantly from traditional self-callers on sociodemographic factors, tobacco use characteristics, and received Helpline services.[12] Specifically in regard to Helpline services, fax-referred clients were significantly less likely to receive NRT and the multiple call program.[12] An important question that remains unclear is whether fax-referred registrants have quit outcomes similar to those among self-callers. To determine the impact of the hospital- and clinic-based fax referral program on quit outcomes, this paper presents the results of a longitudinal study using the Oklahoma Tobacco Helpline registration and 7-month follow-up data to compare hospital- and clinic-based fax-referred registrants to registrants who proactively called the Helpline.

METHODS

The Helpline evaluation methodology, including the analysis of fax referral data, was approved by the University of Oklahoma Health Sciences Center IRB (2616). A total of 11,966 individuals were fax-referred to the Helpline for services from March 2013 to October 2014. Of the 11,966 fax referrals, a total of 3,868 (32%) registered with the Helpline. For the current analysis that focuses on hospital- and clinic-based fax referrals, individuals referred from mental health services were excluded.

Fax-referred registrants were then screened to take part in the 7-month follow-up survey for the Helpline evaluation during Fiscal Years 2014 and 2015. Eligibility criteria for 7-month follow-up are listed in Table 1. NAQC recommends that quitlines follow up 7 months (1 month of treatment and quit attempt followed by 6 months) after registration, as this is equivalent to the 6-month quit rate measurement commonly used in clinical trials and much of the literature.[18] A total of 1,268 fax referrals were eligible for the 7-month follow-up survey, of which 996 were randomly sampled. The response rate for the 7-month follow-up survey was 53.9% among fax-referred registrants, resulting in a sample size of 537 for the longitudinal analysis of quit outcomes. For this analysis, fax-referred registrants were compared to self-callers who registered with the Helpline during the same time period. From March 2013 to October 2014, there were 42,472 self-callers to the Helpline. A total of 23,503 self-callers were eligible for the 7-month follow-up survey (based on criteria listed in Table 1), of which 5,391 were randomly sampled. The follow-up survey response rate for self-callers was 47.8%, resulting in a sample size of 2,577 self-callers for longitudinal analysis. Figure 1 provides an overview of inclusion criteria and samples sizes.

Statistical Analysis

Among individuals who completed the 7-month follow-up, sociodemographic characteristics, cigarettes per day at registration, and Helpline services (NRT and service type) were compared between the fax-referred registrants and self-callers. Contingency table

Table 1. Eligibility Criteria for Oklahoma Tobacco Helpline's 7-Month Follow-up Survey

Tobacco users requesting counseling
Consented to follow-up
Aged 18+
Oklahoma resident
English language preferred
Mailing address exists
Contact information exists (phone or email)
One or more counseling calls
No prior counseling registration in last 12 months
First counseling registration in sampling month
No group home, jail, prison phone numbers
Non-mental health service clinic referral
Non-HealthChoice Insurance
Not sampled for Web Coach survey past 12 months
Not sampled for Helpline 13-month survey past 12 months
First member of household sampled in past 12 months (full address match)
First member of household sampled in past 12 months (partial match - verified)

chi-square tests were used to identify statistically significant differences between fax-referred registrants and self-callers. Quit outcomes were assessed at the 7-month follow-up, consistent with recommendations from NAQC.[18] At 7-month follow-up, registrants were asked the following question to assess quit status: *Have you smoked any cigarettes or used tobacco, even a puff or pinch, in the last 30 days?* Those who responded *no* were considered to have quit (30-day point prevalence abstinence). The 30-day responder quit rate was calculated among registrants who completed the 7-month follow-up survey. Intention-to-treat (ITT) quit rate was calculated among all registrants randomly selected for follow-up and assumes those who did not complete the 7-month follow-up continued smoking, as well as those who did complete the 7-month follow-up survey and were missing for quit (n=8). In other words, basic imputation was used where those who were missing or lost to follow-up were assumed to have continued smoking.

Contingency table chi-square tests and relative risks were used to identify statistically significant differences in 30-day point prevalence abstinence at 7 months between fax-referred registrants and self-callers. Bivariate analyses and log-binomial models were used to assess the presence of confounding by sociodemographic characteristics, cigarettes per day at registration, Helpline services, and presence of a smoking ban in the home. To evaluate the potential for loss to follow-up bias, characteristics of individuals who completed and did not complete the 7-month follow-up survey were compared within each caller type. Analyses were conducted in 2015 with SAS, version 9.4. A two-sided p-value <0.05 was considered statistically significant.

RESULTS

Hospital- and clinic-based fax-referred registrants who completed the 7-month follow-up survey compared to self-callers who completed the 7-month follow-up survey were significantly more likely to be older (49.4 years vs 47.6 years), white (70.6% vs 59.1%), and non-Hispanic (96.8% vs 94.2%) (Table 2). Self-callers were significantly more likely to be uninsured (36.5% vs 29.4%). Uninsured status includes individuals reporting only Veteran coverage and Indian Health Service care. There was no difference in gender and education level by caller type. A significantly greater proportion of fax-referred registrants (54.0%) smoked fewer than one pack of cigarettes per day compared with self-callers (44.9%). Almost three quarters (71.3%) of fax-referred registrants received

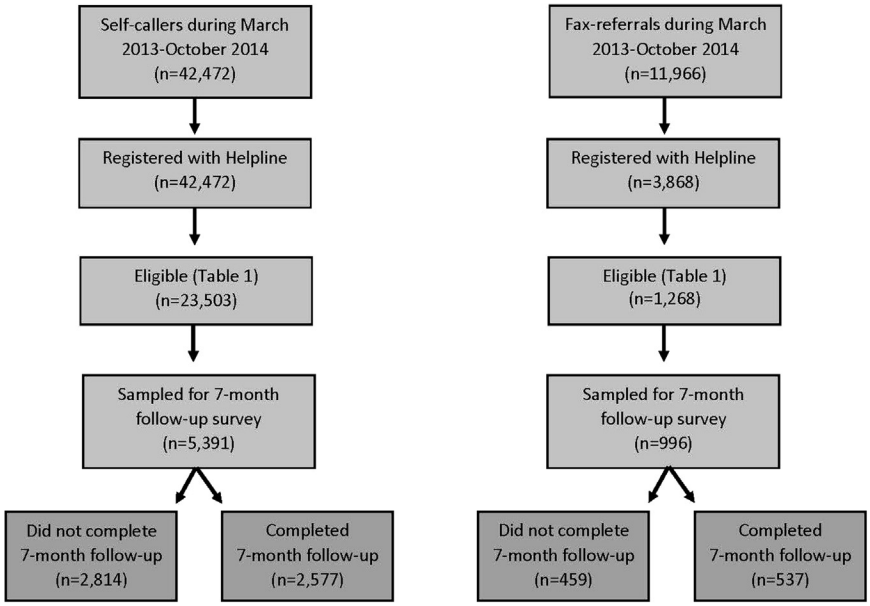

Figure 1. Inclusion criteria for 7-month follow-up survey among self-callers and fax-referrals to the Oklahoma Tobacco Helpline from March 2013 to October 2014.

the Helpline's multiple call program, and this was no different than the proportion among self-callers (74.8%). Fax-referred registrants were significantly more likely to have not received NRT compared with self-callers (20.1% vs 7.7%).

Among all registrants who completed the 7-month follow-up survey, nearly one third (31.4%, 95% CI=29.8%, 33.0%) reported not using tobacco for the past ≥30 days (Table 3). By caller type, 29.3% of hospital- and clinic-based fax-referred registrants reported not using tobacco for ≥30 days at 7 months post-registration, and this was similar to the responder quit rate among self-callers (31.8%). The likelihood of quitting tobacco for ≥30 days at 7 months post-registration among fax-referred registrants did not differ significantly from self-callers (relative risk, 0.92; 95% CI=0.80, 1.06). Adjustment for baseline characteristics did not change the relative risk estimate by ≥10% and so were not included in the final model. The overall 30-day ITT quit rate was 15.2% (95% CI=14.4%, 16.1%). By caller type, the ITT quit rate among fax-referred registrants was not significantly different than the ITT quit rate among self-callers (15.8% vs 15.2%).

Among both fax-referred registrants and self-callers, there were significant differences between individuals who did and did not complete the 7-month follow-up survey (Appendix Table 1, available online). Among both caller types, individuals who did not complete the follow-up survey were significantly more likely to be younger and to have not completed high school when compared with individuals who did complete the follow-up survey. Among fax-referred registrants, individuals who did not

Table 2. Characteristics of Fax-Referred Registrants and Self-Callers From March 2013 to October 2014 Who Completed Follow-up

Characteristics[a]	Fax-referred (*n*=537)	Self-callers (*n*=2,577)	*p*-value
Age in years, M (SD)	49.42 (15.88)	47.60 (14.53)	**0.0144**
Gender			0.2153
Female	61.64	58.75	
Male	38.36	41.25	
Race			**<0.0001**
White	70.55	59.08	
Black	15.11	18.52	
American Indian	10.33	18.21	
Other	4.02	4.19	
Ethnicity			**0.0175**
Hispanic	3.23	5.79	
Non-Hispanic	96.77	94.21	
Education			0.2814
≤High school	23.00	19.93	
High school degree/GED	35.55	36.83	
≥Some college/technical school	41.44	43.25	
Health insurance status			**0.0056**
Private	26.18	22.04	
Medicaid	22.98	19.35	
Medicare	21.47	22.08	
Uninsured	29.38	36.53	
Cigarettes per day at registration			**0.0002**
<1 pack	54.00	44.90	
1 pack	28.49	31.43	
>1 pack	17.50	23.67	
Helpline service			0.0961
Multiple call program	71.32	74.78	
One call program	28.68	25.22	
Received NRT from Helpline			**<0.0001**
Yes	79.89	92.32	
No	20.11	7.68	

Note: Boldface indicates statistical significance ($p<0.05$).
[a]Characteristics are % unless otherwise noted.
GED, General Educational Development test; NRT, nicotine replacement therapy.

Table 3. 30-Day Quit Rates Among Fax-Referred Registrants and Self-Callers From March 2013 to October 2014

	% (95% CI)	Relative risk (95% CI)	*p*-value
30-day responder quit rate			
Caller type			0.2495
Self-callers (*n*=2,570)	31.83 (30.03, 33.63)	Ref	
Fax-referred (*n*=536)	29.29 (25.43, 33.16)	0.92 (0.80, 1.06)	
30-day intention to treat quit rate			
Caller type			0.6238
Self-callers (*n*=5,391)	15.15 (14.20, 16.11)	Ref	
Fax-referred (*n*=996)	15.76 (13.50, 18.03)	1.04 (0.89, 1.22)	

complete the follow-up survey were significantly more likely to be female when compared with individuals who did complete the follow-up survey (68.2% vs 61.6%). Self-callers who did not complete the follow-up survey compared with those who did were significantly more likely to be of American Indian race (21.4% vs 18.2%), to be uninsured (49.1% vs 36.5%), to have smoked more than one pack of cigarettes per day (27.3% vs 23.7%), and to have received the Helpline multiple call program (82.4% vs 74.8%).

DISCUSSION

This longitudinal study examined registration and 7-month follow-up data among fax-referred registrants and those who proactively called the Oklahoma Tobacco Helpline. Although significant differences in demographic characteristics, tobacco use behavior, and Helpline services were observed between fax-referred registrants and self-callers, quit outcomes at 7-month follow-up did not differ. Overall, this research suggests that fax-referred patients who register with the Helpline are as successful as self-callers and supports fax referrals as a method to help smokers, who might never have accessed these evidence-based services, quit.

This was not an RCT. There were differences between fax-referred registrants and self-callers at baseline. Compared with self-callers, fax-referred registrants were more likely to be older, white, non-Hispanic, report a lower number of cigarettes per day, be privately insured, and to have not received NRT from the Helpline. These characteristics have been shown to be associated with cessation outcomes.[16,19–21] Fax-referred registrants were less likely to have received NRT from the helpline. This may be a reflection of their health insurance status and contraindications for NRT. Also, fax-referred registrants, having a recent encounter with a hospital or clinic, may be receiving prescription pharmacotherapy or may have already started NRT under the advice of their physician.

Fewer cigarettes per day may reflect fax-referred registrants are lighter smokers, less addicted, and thus will be more successful with quitting. Fewer cigarettes among hospital- and clinic-based fax-referrals may also reflect behavior change already initiated as a result of an encounter with a healthcare provider or a hospital's smoking ban. Demonstrating that the fax referral system helped registrants reduce their cigarette consumption prior to registration would provide important evidence for the program's impact. Unfortunately, data prior to Helpline registration are unavailable. Thus, the authors are limited in drawing conclusions on whether the lower cigarette per day use among fax-referred registrants is a baseline difference or a change that occurred as a result of receiving treatment via the provider referral system.

To understand whether differences in baseline characteristics impacted quit outcomes, the quit ratio between fax-referred registrants and self-callers was adjusted for characteristics measured at baseline. Adjustment for characteristics did not change the relative risk estimate by more than 10%; thus, characteristics measured at baseline were not observed to confound the relationship between caller type and quitting. However, there are other characteristics known to be associated with smoking cessation (e.g., motivation to quit, age at smoking initiation, time to first cigarette, substance abuse, mental health conditions),[20,21] and even unknown or unmeasured factors, which may be biasing the observed quit ratio between fax-referred registrants and self-callers. This is a common limitation of observational studies, including the present study.

The NAQC-recommended target goal for quitline follow-up response rate is 50%.[18] This recommendation was achieved among fax-referred registrants as nearly 54% received follow-up at 7 months. However, significantly fewer self-callers responded than fax-referral registrants (47.8% vs 53.9%, p=0.0004). Similar response rates were observed in a prior study of Massachusetts quitline callers.[16] The authors suggested the lower response rate among self-callers may result in an

overestimation of their quit rate, as those who have poorer outcomes are likely harder to reach.[16]

To better understand the potential for loss to follow-up bias, registrants who had follow-up data were compared to registrants who did not have follow-up data within fax-referred and self-caller groups. Significant differences in characteristics were observed between those who completed versus those who did not complete the follow-up survey within each caller type. As both caller types differed similarly with regard to age and education (e.g., among both caller types, individuals who did not complete the follow-up survey were significantly more likely to be younger and to have not completed high school when compared with individuals who did complete the follow-up survey), loss to follow-up bias is likely minimal with regard to these characteristics. Of concern are the differences in gender, race, health insurance status, and tobacco use. Self-callers who did not complete the follow-up survey versus those who did were more likely to be American Indian, uninsured, to have smoked more than one pack of cigarettes at registration, and to have received the multiple call program, but these differences were not observed among fax-referred registrants. Additionally, fax-referred registrants who did not complete the follow-up survey were more likely to be female, but this was not observed among self-callers. Quit outcomes have shown to be worse among women,[22–24] American Indians,[25,26] those who are more nicotine dependent,[1,20,27] and the uninsured.[27,28] Because those lost to follow-up are likely to have poorer quit outcomes, the authors used basic imputation where self-callers and fax-referred registrants who were lost to follow-up were assumed to have continued smoking. Like the non-imputed quit rates, the imputed quit rates (e.g., intention to quit) were not significantly different by caller type. A prior study of Massachusetts quitline callers employed propensity score weighting to minimize loss to follow-up bias.[16] Like the present study, quit outcomes corrected for loss to follow-up were similar to uncorrected quit outcomes.

The question of whether fax-referred smokers can achieve similar rates of cessation as self-callers is important and complex. Few prior studies have examined this question. In an observational study of the Massachusetts quitline, Song and colleagues[16] compared provider-referred (fax or electronic) registrants to self-callers and found provider-referred registrants were less likely to utilize quitline services and to have been quit at 6–8 months of follow-up (20.1% vs 26.2%, $p \leq 0.0004$). They reported unadjusted results, thus failing to assess the presence of confounders. Although baseline characteristics were not observed to be confounders in the present study, confounders are dependent on the study population and should have been explored in Song et al. By contrast, an Arizona quitline study assumed all non-responders continued smoking and observed a significantly higher 30-day point prevalence quit rate among provider fax-referred registrants versus self-callers.[18] This observational study was limited by substantially high rates of loss to follow-up among both groups (81.2% for self-callers and 64.7% for provider referred).[18]

As technology and the use of electronic medical records have increased, national standards have been developed for bidirectional electronic communication between quitline case management systems and healthcare system electronic health records.[29] This new form of referral is termed an eReferral and is increasing in use. Successful implementation of eReferral systems can be used to meet performance measures for the Electronic Health Record Incentive Program, Joint Commission, Physician Quality Reporting System, and Healthcare Effectiveness Data and Information Set. In the future, it will be important to compare quit outcomes between fax referrals and eReferrals.

CONCLUSIONS

This observational study is one of the first to report long-term quit rates for fax-referred tobacco quitline participants and documents similar rates of 30-day abstinence as self-callers. This study has significant implications for initiatives aimed at reducing tobacco abuse as it shows patients fax-referred by hospitals and clinics to quitlines may be as successful as self-callers in quitting smoking.

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SUPPLEMENTAL MATERIAL

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