Evaluation of Telephone Counseling to assist Smoking Cessation

Original Research Article

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ABSTRACT

Behavioral support programs using telephone counseling models have been recognized as an effective tool for smoking cessation, and a proper assessment of the program is important to provide robust support to quit smoking. This study examines if other factors may influence quitting rates in adult smokers who had telephone counseling. We conducted a retrospective cohort study comparing quitting rates from September 2016 to January 2017 with the referral from various sources (Medicine, Pre-Surgery or Post-Surgery visits, Hospital or ED discharges, and everywhere else), each counselor, use of an assisting medication and the BMI with adjustment for other covariates. Logistic regression analysis of 268 smokers compared differences in the quitting rates achieved by the four counselors. The adjusted ORs for the counselors were 0.89 (95% CI 0.46-1.73), 0.70 (95% CI 0.19-2.57), and 0.71 (CI 0.35-1.44) when comparing to one counselor. The OR for referral type was 1.81 (95% CI 0.59- 5.50) comparing Surgery to Medical referral and 0.93 (95% CI 0.41- 2.13) comparing referral from Hospital discharge to medical type. Pharmacotherapy (OR 1.68, 95% CI 0.92-3.08) and BMI (OR 0.79, 95% CI 0.60-1.02) showed no significant association with quitting rates. In conclusion, telephone counseling demonstrated consistent quitting rates in the different referral types and counselors, and the efficacy of counseling may be not related to any other factors such as medications or personal BMI.

KEYWORDS:

telephone counseling; smoking cessation; quitting rates

I. INTRODUCTION

Smoking is one of the most preventable causes of morbidity and death in the U.S., causing diseases in more than 16 million Americans [1]. Additionally, tobacco use causes nearly six million deaths worldwide per year, including 480,000 deaths per year in the United States [2]. The prevalence of smoking has decreased over time in the U.S., but smokers still comprised 15.5% of all adults in 2016 [3]. When asked if the smoker was ready to quit now, only 68.0% of adult smokers considered quitting smoking someday [4]. Most smokers had no interest when they were asked specifically about quitting in the near future. Therefore, effective interventions are imperative to motivate tobacco users to stop [5]. In 2015, 55.4% of smokers were motivated enough to at least attempt to quit, and 7.4% of smokers successfully quit during the previous year [4].

The National Health Interview Survey showed that 57.4% of smokers had heard advice to quit from a health professional. Smokers older than 45 years of age, with higher educational achievements, and current health insurance coverage were more likely to hear advice from health professionals, but less than one-third of smokers used counseling for cessation [6]. Even brief, generalized advice from physicians could motivate smokers effectively. Physicians specifically trained in tobacco cessation performed no better than physicians without cessation training, when assessing their patients' quitting rates [7,8]. While patients are more likely to eventually discontinue smoking if they more frequently hear advice from physicians, health professionals tend to hesitate to provide advice. This reluctance stems from insufficient time, low confidence in their counseling abilities, and concern for offending patients [8,9,10]. Additionally, patients may not fully engage even with proactive interventions.

Most Americans consider tobacco smoking harmful, but quitters encounter many challenges. To assist smokers in quitting, several strategies have been developed and studied by medical professionals. Brief advice from health-care workers, telephone help lines, text messaging, and printed materials are all affordable interventions to promote and assist smoking cessation [10]. Studies have also shown behavioral support and pharmacotherapy to be effective at statistically significant levels [8,11]. Proactive interventions such as telephone calls by clinicians and nicotine replacement therapy showed higher prolonged abstinence rates at one year than usual care did [16.5% vs. 12.1%; OR 1.47, 95% CI 1.12 to 1.93] [12]. Even patients who received Nicotine Replacement Treatment (NRT) with one-time telephone counseling achieved high quitting and satisfaction rates [13]. Used together, nicotine replacement treatment and counseling (including encouragement to regularly use assistive medications) were more effective still [14,15].

At the Kaiser Permanente Redwood City Medical Center in San Francisco Bay Area, the Department of Health Education operates a Tobacco Cessation Program pursuing a high rate of smoking cessation through diverse interventions. The Tobacco Program provides an option for patients to receive telephone counseling with a counselor. Once a counselor receives notification of a patient referral from one of the sources, the counselor contacts the smoker by telephone. Counselors follow their routine protocol to question patients and chart data on smokers' current or past amount of cigarette use, readiness to quit, number of quit attempts, medication use, and referring clinicians, if any. As part of the active call format, counselors can provide additional behavioral support to smokers attempting to quit. Counselors will also reinforce medication use throughout follow-up, if the physician prescribed it. Patients can also access a smoker's telephone hotline (a passive call format with more aggressive messaging), an ex-smoker support group, and telephone counseling with a wellness coach. The program also offered assistance to help patients quit with upcoming surgeries, emphasizing that quitting before surgery can prevent untoward outcomes and significantly reduce the risk of complications [16]. The impact of telephone counseling programs has been proven in providing smokers who are motivated to quit with behavioral support. [8-11,17] These findings support the value and necessity of funding telephone-counseling services in combating preventable risk factors to public health.

Given the importance of behavioral support to quit smoking and the known effect of telephone counseling to improve the quitting rates, a proper assessment of the telephone-counseling program will provide effective use of resources. As an assessment of the quality of counseling program, we measured the consistency of quitting rates throughout different contributing factors.

To evaluate the quality of this program, we measured if differences exist in patient quitting rates among individual counselors and referrals from distinct sources. Consistent effect among counselors is important information to provide confidence to participants as well as providers of the program. Furthermore, finding out the difference in quitting rates observed depending on how smokers were referred to counseling will help to build a better strategy to assist cessation. For those purposes, the study proposed the following NULL hypotheses:

1. The success rates of telephone counseling for smoking cessation are not different among individual counselors.
2. Referrals from various sources (Hospital or ED Discharge, Medical, Surgical, Other) to the Telephone Counseling Program result in the same quitting rates.

II. METHODS

Study Design

We conducted a retrospective cohort study identified what, if any, differences exist in patients' quitting rates among individual counselors or referrals from distinct sources or between users of medication and non-users.

Study Population & Statistical Analysis

At a local medical center under an exclusive insurance membership, the prevalence of smoking was 6.6 - 6.8%. The prevalence of smokers in this community is low compared to the prevalence of smoking in Northern California.[18] Crude analysis for the number of quitters after telephone counseling with a counselor produced an odds ratio as high as 17.53 in (95% CI 12.1-25.2) as compared to patients who quit without any counseling. (Smokers were categorized as either receiving counseling at least once or not receiving counseling.)

Retrospective Cohort Study: Identified what, if any, differences exist in patient quitting rates among individual counselors or referrals from distinct sources or between users of mediation assistance.

Inclusion Criteria

- Smokers attempting to quit for the first time (this part of the study excluded second-time quitters through counseling service) among patients of a local medical center under an exclusive medical insurance service.
- Participants in at least one completed telephone counseling session with a counselor during the study period (we categorized participants who had contact with a counselor, but failed to complete a single session as not receiving counseling.) The counselors in this study were all certified as Clinical Health Educators.

- Patients referred from a known source, distinguished by four types:
  - Discharge – referral upon discharge from hospital or emergency room
  - Medical – referral from the department of medicine
  - Surgical – referral before or after surgical services
  - Other – referral distinct from the above three types
- Patients using assisting medication or Nicotine Replacement Treatment (NRT)

Timeframe: retrospective follow-up from September 2016 to January 2017
Analysis (STATA 15.1®)

- Logistic Regression: assessed quitting rates among smokers participating in the Telephone Counseling Program, as impacted by individual counselors or by referrals from distinct sources.

The retrospective cohort study used data collected by counselors, through their sessions with patients from September 2016 to January 2017. Counselors questioned participants in telephone counseling sessions according to their department's protocol. Participants reported their smoking or quitting status by self. The study neither counted the number of counseling sessions nor attempted to evaluate the effects of greater numbers of counseling sessions on patients. The original data set was compiled in Excel format and then converted into STATA 15.1® format. Additional health information was obtained from the chart review of individual medical records. This study was exempt from the IRB review as personal identification was removed from the data and the program evaluation required no intervention with human subjects.

Characteristics of participating smokers

All 268 participants in the analysis were smokers who had completed the telephone counseling session at least one time during the study period. They have the median age of 49.9 years (ranged 20 to 92) and gender ratio with male 60.8%, and the baseline characteristics between the quitter group and the group failed smoking cessation was not different as t-test shows (**Table 1**).

Table 1. Baseline characteristics of Participants in the Telephone Counseling(September 2016 - January 2017)

Variable	Smoking cessation (N= 268)		*p*-value (t test)
	Y (N= 89)	**N** (N = 179)	
Age Mean (SD)	51.9 (14.0)	48.9 (13.6)	0.10
18-34 **35-49** **50-64** **>=65**	10 (11.2%) 29 (32.6%) 35 (39.3%) 15 (16.9%)	30 (16.8%) 58 (32.4%) 68 (38.0%) 23 (12.8%)	
Male (%)	64%	59.2%	0.44
BMI (kg/m^2) Mean (SD)	28.4 (5.2)	29.7 (6.8)	0.07
<18.5 **18.5-24.9** **25.0-29.9** **30.0-34.9** **>=35.0**	2 (2.2%) 20 (22.5%) 38 (42.7%) 23 (25.8%) 6 (6.7%)	2 (1.1%) 42 (23.9%) 56 (31.8%) 43 (24.4%) 34 (19.3%)	
Cigarette per day Mean (SD)	11.1 (8.3)	12.1 (8.4)	0.33
1-5 **6-10** **11-20** **>20**	33 (37.5%) 25 (28.4%) 25 (28.4%) 5 (5.7%)	49 (27.3%) 64 (35.8%) 58 (32.4%) 8 (4.5%)	
Chronic disease	59.6%	54.7%	0.46
Nicotine Replacement Treatment (NRT)	63.9%	64.8%	0.76
Varenicline or Bupropion	32.6%	25.1%	0.21

III. RESULTS

The retrospective cohort study over the period from September 2016 to January 2017 was conducted using logistic regression to analyze 268 subjects (**Table 2**). The study evaluated differences in the quitting rates achieved by the four counselors. The odds ratios among counselors were 0.89 (95% CI 0.46 -1.73), 0.70 (95% CI 0.19-2.57), and 0.71 (CI 0.35-1.44) comparing to one counselor. Additionally, the retrospective cohort study evaluated differences in quitting rates based on referral sources. The odds ratios among referral types were 1.81 (95% CI 0.59-5.50) comparing Surgery to Medical referral and 0.93 (95% CI 0.41-2.13) comparing referral from Hospital discharge to medical department. In conclusion, different referral types and counselor variability did not produce statistically significant differences in quitting rates at 95% confidence interval. This study failed to reject the null hypotheses that specific counselors or referral sources had no added effect on quitting.

Though there was no statistically significant association between BMI or number of cigarettes per day and quitting rates, participants smoking a small number of cigarettes (less than 5 per day) had higher rates of quitting, and smokers with severe obesity (BMI > 35) had poor success rates to quit on follow-up. Both nicotine replacement treatment (OR 1.08, 95% CI 0.60-1.95), and pharmacotherapy (Varenicline or Bupropion) (OR 1.68, 95% CI 0.92-3.08) did not seem to make any substantial difference in quitting rate among smokers who received telephone counseling (**Table 2**).

Table 2. Number of quitters by condition & Retrospective Cohort Analysis (Logistic Regression with adjustment for covariates)

		Quit	Total	Adjusted OR	95% CI
Referral	Discharge	12 (30.8%)	39	0.93	0.41 - 2.13
	Surgical	8 (50.0%)	16	1.81	0.59 - 5.50
	Discharge	4 (36.3%)	11	1.23	0.32 - 4.72
	Medical	65 (32.2%)	202	Reference	
	Total	89 (33.2%)	268		
Counselor	Counselor 1	29 (34.5%)	84	0.89	0.46 - 1.73
	Counselor 2	4 (26.7%)	15	0.70	0.19 - 2.57
	Counselor 3	36 (36.0%)	100	0.71	0.35 - 1.44
	Counselor 4	20 (30.0%)	69	Reference	
	Total	89 (33.2%)	268		
Medication Intake	No Medication	60 (30.1%)	194	Reference	
	Varenicline or Bupropion	29 (39.2%)	74	1.68	0.92 - 3.08
	Total	89 (33.2%)	268		
Nicotine Replacement	Non-NRT	33 (34.4%)	96	Reference	
	NRT	56 (32.6%)	172	1.08	0.60 – 1.95
	Total	89 (33.2%)	268		
Age Range	18-34	10 (25.0%)	40	1.19 (in increments of range)	0.86 - 1.66
	35-49	29 (33.3%)	87		
	50-64	35 (34.0%)	103		
	>65	15 (39.5%)	38		
	Total	89 (33.2%)	268		
Gender	Female	32 (30.5%)	105	Ref	
	Male	57 (35.0%)	163	1.42	0.89 - 2.48
	Total	89 (33.2%)	268		
Chronic Disease	Non-chronic	36 (30.8%)	117	Reference	
	Chronic	53 (36.4%)	151	1.13	0.60 - 2.12
	Total	89 (33.2%)	268		
Cigarette consumption per day	1-5	33 (40.2%)	82	0.77 (in increments of range)	0.56 - 1.04
	6-10	25 (28.0%)	89		
	11-20	25 (30.1%)	83		
	>20	5 (38.5%)	13		
	Total	88 (33.0%)	267		
BMI range	18.5-24.9	20 (32.3%)	62	0.79 (in increments of range)	0.60 - 1.02
	25.0-29.9	38 (40.4%)	94		
	30.0-34.9	23 (34.8%)	66		
	>35.0	6 (15%)	40		
	Total	89 (33.5%)	266		

IV. DISCUSSION

We evaluated the variables that influenced the Tobacco Cessation Program at a local medical center. This retrospective cohort study demonstrated relatively uniform performance by counselors in a Telephone Counseling Program and suggests that patients might be likely to quit at a consistent rate of approximately 33% regardless of referral sources. One might be concerned about a broader range of variable success depending counselor's skills. The comparison among counselors showed that individual skills made no significant difference in assisting quitters when counselors of similar qualifications (all certified Clinical Health Educators in this study) practiced according to standard protocols. This finding suggested that possible personality mismatches of smokers to counselors were not significant concerns, and it can provide participants with more trust that is fundamental to successful counseling. The implementation of a Telephone Counseling Program where counselors are used and everyone is working toward a common mission of supporting smoking cessation following a standard protocol could be a successful model. Secondly, the comparison between referrals upon discharge from the hospital or emergency room or near surgical interventions and referrals from medical departments indicated no substantial difference in quitting rates, suggesting the broad applicability of this model in various clinical settings.

Among participants of counseling services, the characteristics of age, gender and the presence of chronic disease did not appear to influence the rates of quitting. This could be because motivated smokers tend to quit based on other factors related to their intrinsic desire to quit. This could also be due to the low prevalence rate of smokers in the community. Another possible explanation is that the power of our study was not sufficient to pick up these differences.

Our study examined three different factors that might be associated with higher quitting rates when combined with telephone counseling. The first factor is using pharmacotherapy (Varenicline or Bupropion) (OR 1.68, 95% CI 0.92-3.08). We couldn't reach a statistically significant result, but other studies showed the effective cessation of smoking with the adoption of assisting medication such as Varenicline or Bupropion._Strong physician support in encouraging patients to fill their smoking cessation, given the fact that patients frequently fail to pick up their prescription medications[19,20], should be emphasized. To achieve statistical significance, a future study with a larger sample size over a longer duration of follow-up might provide the power needed to demonstrate the link between using an assisting medication and telephone counseling in getting patients to quit tobacco use. The second factor is smoking fewer cigarettes per day. Patients who smoke fewer cigarettes are likely more able to quit with telephone counseling because of lower nicotine addiction.[21] The third factor is BMI (OR 0.79, 95% CI 0.60-1.02) and smokers with morbid obesity (BMI over 35) had higher failure rates on follow-up as shown in Table 2. This is consistent with the known fact that patients who have a higher BMI tend to smoke more. Fear of weight gain is often a reason why people are resistant to quitting tobacco use.[22] It should be noted that while these factors were shown to be associated with lower quitting rates in other studies, none of these factors reached statistical significance in our study. Again, we suspect that the power of study was not sufficient to pick up these differences.

The strengths of our investigation include the design of the study as a cohort follow-up and its practical question exploring the details in operating telephone counseling to assist smoking cessation in the community. More participants with longer follow-up could provide more power and deliver more reliable and statistically significant results. This study did not consider repeated contacts for telephone counseling or total time spent in telephone counseling. Participants may need various levels of intensity of telephonic contacts over a longer period. The patients evaluated by this study were also subject to self-reporting and selection bias. They may have misrepresented theirsmoking history for any number of reasons, including embarrassment, poor recall, or desire to please the telephone counselor. Some of the participants in telephone counseling had already quit and were using the service for behavioral support as a tool to keep them from smoking again. The study did not identify these cases. Also, the relatively low prevalence of smokers in this population suggests that the remaining smokers may be harder to convince to quit or may not be agreeable to telephone coaching. Finally, some of the contacts attempted by counselors to known smokers were unsuccessful because they did not answer the phone or continue counseling. These factors decrease the generalizability of this study.

In summary, the findings supported the value of telephone counseling as a mechanism for helping patients to quit smoking and support the concept of our health care system deploying resources to these endeavors. This study confirms that telephone counseling can achieve consistent quitting rates, even in the setting of multiple uncontrollable variables and circumstances. The data did not show the significant association between the quitting rates and pharmacotherapy along with counseling to assist smokers in quitting. Given that smokers with morbid obesity (BMI >35) had lower success rate on follow-up, combining obesity counseling with smoking assistance could make a synergistic impact. The telephone-counseling program supports smokers who want healthcare professional engagement and are motivated to quit. Encouraging unmotivated or unengaged smokers to quit remains an area of improvement for smoking cessation.

V. ACKNOWLEDGEMENTS

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VI. HIGHLIGHTS

- Telephone counseling is an effective tool to assist smoking cessation.
- Different counselors and referral types produced consistent quitting rates.

VII. FUNDING SOURCES

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

VIII. CONFLICT OF INTEREST

The authors of this paper reported following conflicts of interests.

Dong Hoon Lee MD, MPH, Eric Mebane MD, and Rashmi Saini MD are employees of Kaiser Permanente where this study was conducted.

Zhao Chen PhD, MPH reported no financial disclosures.

IX. ABBREVIATIONS

CI = Confidence Interval, OR = Odds ratio, Q = Quarter, ED = Emergency Department, SD = Standard Deviation, BMI = Body Mass Index, NRT = Nicotine Replacement Treatment

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