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Trial Design: The St. Jude Children's Research Hospital Cancer Survivors Tobacco Quit Line Study

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Abstract

Nearly, one-fifth of childhood cancer survivors (CCSs) smoke cigarettes. Because CCSs are already at greater medical smoking-related risks, targeting them for smoking cessation efforts is a high priority. One of the major challenges with smoking cessation in CCSs is how to reach such a geographically dispersed population. This study aims to demonstrate that these challenges can be overcome through the use of telephone-based tobacco Quit Lines (QLs). This report describes the design of the St. Jude Cancer Survivor Tobacco QL study, which is a randomized controlled clinical trial that will examine the long-term (1-year) efficacy of a counselor initiated versus participant initiated tobacco QL with adjunctive nicotine replacement therapy (NRT) in both groups. Participants (N = 950) will be recruited nationally and randomly assigned to one of the two interventions. The counselor initiated intervention includes six scheduled telephone sessions of a behavioral intervention and provision of 8 weeks of NRT. The participant initiated intervention allows the participant to call the QL at their convenience, but includes the same six telephone sessions and provision of 2 weeks of NRT. Both groups will receive two follow-up phone calls at 8 weeks and 1 year after enrollment to assess their smoking status. The primary outcome measure is cotinine-validated self-reported smoking abstinence at 1-year follow-up. Results from this study will provide the first evidence about the efficacy of intensive QL cessation intervention in this high risk population. Such evidence can lead as well to the dissemination of this intervention to other medically compromised populations.

INTRODUCTION

There are approximately 270,000 adult survivors of childhood cancer in the US [1]. In 2000, the National Cancer Institute estimated that there were approximately 10 million cancer

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survivors (adult and child survivors) in the U.S. [2]. As cancer therapies improve, the cure rate for pediatric cancers now exceeds 80% and the number of childhood cancer survivors is dramatically increasing [3]. Surprisingly, estimates place the prevalence of smoking among childhood cancer survivors close to that of the general adult population (18% vs. 19.8%, respectively) [4,5]. Pediatric cancer patients are already at risk for developing secondary cancers due to late effects of childhood cancer treatment and genetic factors [6–13]. Relative to their siblings, childhood cancer survivors are 8.2 times more likely to have severe or life-threatening health conditions [14–16]. Exposure to tobacco is known to influence an individual's risk for disease [17] and, thus, may further increase the risk of adverse health effects among cancer survivors [18,19]. As such, childhood cancer survivors are likely to be at high risk for health problems when they smoke and targeting them with smoking cessation efforts is a high priority.

One of the major challenges with smoking cessation in CCSs is how to reach such a geographically dispersed population. One method of overcoming the geographic diversity is through the use of technologies such as telephone-based smoking cessation QLs. QLs are increasingly being recognized as a key component of many comprehensive tobacco control programs [20,21]. QLs are now available throughout most of North America [22], Europe, Australia [23], and many other locations around the world. A key factor in the worldwide adoption of QLs is the solid evidence of their efficacy based on several meta-analytical reviews [24–27].

Pooled data from eight clinical trials with large community samples concluded that counselor initiated QLs (where the counselors proactively contact participants at a predetermined time using a standardized intervention protocol) are associated with increased chances of quitting smoking relative to minimal interventions [28–35]. On the other hand, participant initiated QLs (where participants can call any time during the hours of operation and receive as much or as little intervention as they need), also have been widely implemented, but there have been only two controlled trials that test and support the efficacy of this approach [36,37]. However, most of the studies that have directly compared the effectiveness of counselor initiated QLs versus participant initiated QLs in a "real world setting" showed higher quit rates for counselor initiated compared to participant initiated intervention [28,30,38–40].

Research also demonstrates a positive dose-response relationship between number of telephone counseling sessions and long term abstinence. According to a recent Cochrane review [27], three studies compared different schedules and numbers of call-backs to test a dose-response effect [31,33,34]. In the first study, no difference was reported between two and six additional calls following an initial 50 minute session [33]. In the second study, six calls increased rates by a further 2% over a single pre-quit call-back [31]. In the third study, an initial extended counseling call with the offer of four further calls increased quit rates by about 1% over an extended counseling call and a brief reminder call [34].

In terms of the intervention content, a recent Cochrane review concluded that the best quit rates are achieved when smokers receive both pharmacological and behavioral treatment [41]. Therefore, an increasing number of QLs have added medication to their cessation service. Eighteen QLs in the United States currently provide free quit medications and five provide discounted quit medications to at least some of their customers [42]. An additional advantage of NRT is that it increases utilization of QLs and adds to their popularity. Lawrence and colleagues recently reported that the addition of free NRT to the Minnesota QL resulted in an eightfold increase in the number of new ex-smokers among registered callers [43]. A similar experience has been reported in the states of New York [44–46], and Oregon [47]. In conclusion, the strongest evidence to date has been for counselor initiated, multi-session counseling with adjunct use of medications [26,27,45].

The only known smoking cessation study in childhood cancer survivors demonstrated efficacy [48,49]. In this study, Emmons and colleagues randomized 796 smokers from the Childhood Cancer Survivor Study (CCSS) to either self-help or peer-counseling tobacco QLs. Results of this study indicate that those in the peer-counseling condition were significantly more likely to self report cessation than the comparison group at 1-year follow-up (15% vs. 9%, $p < .01$) [48], and at long term (2 to 6 years) follow-up (20.6% vs. 17.6%; $P<.0003$) [49]. While a seminal study in the field, there are several issues with this particular investigation. First, cessation rates were not biochemically validated. While the majority of smoking cessation studies can rely on self reports of smoking because they are sufficiently reliable and valid, certain subgroups have shown high rates of falsification, one of which is medical patients [50]. In the case of the CCSs, who represent high risk medical patients, determining smoking status by self-report may underestimate the prevalence of smoking. Therefore, biochemical verification of smoking status is especially warranted in this population. Second, in the Emmons' study, the intervention was delivered by a peer counselor (i.e., the counselors were also childhood cancer survivors). Although peer counseling has been demonstrated to be effective in producing abstinence among CCSs in this study [48], it is more likely that smoking cessation interventions delivered by trained experienced counselors in tobacco dependence will be more effective, less costly, easier to staff, and more amenable to dissemination. Therefore, given that QLs have enormous dissemination potential for CCSs, the main objective of this study is to examine the efficacy of the most intensive QL that has been disseminated to date, counselor initiated QL with an optimal number of sessions, delivered by experienced counselors in tobacco dependence, and with adjunct NRT. To avoid possible falsification of self reports of smoking status, we are validating self-reported point prevalence abstinence at 1-year assessment using salivary cotinine analysis. This report describes the study design, procedures, intervention format and analytic methods of the ongoing St. Jude Cancer Survivors Tobacco QL trial.

METHODS

Design

The present study is a two-arm, randomized controlled clinical trial designed to evaluate the long-term (1-year) efficacy of a counselor initiated QL versus a participant initiated QL with adjunctive NRT in both groups. Participants are randomly assigned to one of two interventions. Participants in the counselor initiated intervention receive six scheduled telephone-based counseling sessions and eight weeks of NRT. Participants in the participant initiated intervention who make all six telephone calls receive the same behavioral intervention as in the counselor initiated intervention and 2 weeks of NRT, and are encouraged to obtain additional NRT to complete their treatment course (8 weeks of NRT). Both groups receive two follow-up phone calls at 8 weeks (post treatment) and 1 year after enrollment to assess their smoking status. The main outcome measures are self-reported prolonged and cotinine-validated point-prevalence abstinence at 1-year follow-up. A graph depicting the study flow is presented in Figure (1). The protocol and consent form have been approved by the Institutional Review Board at St. Jude Children's Research Hospital and the study is registered by the Clinical Trials Registry (#NCT00827866).

It is important to note that we make NRT available to participants in the comparison group for three reasons. First, in designing the study, we opted for a real-world comparison group, in which participants in this group will have information about NRT and access to it as an over-the-counter therapy. Second, we wanted to ensure adherence to the Clinical Practice Guidelines about providing behavioral counseling with medication as a minimum intervention for treating smoking cessation [25]. Third, providing NRT in the comparison group was strongly urged by a panel of quit line experts. There is ample evidence that providing NRT increases both quit

line utilization and outcome [43–47]. In addition, it was believed that the most minimal quit lines in the future will include access to counselors plus some provision of NRT. As such, not providing at least some NRT to the comparison group would be an unfair comparison and not in line with what quit lines are, and what they will be providing in the future.

Study Participants

We are nationally recruiting 950 adult smokers (≥18 years old) who are childhood cancer survivors (cancer diagnosis before the age of 21), and are at least one year out of active cancer treatment. They must have been smoking continuously for the last year, and be willing to make a serious quit attempt in the next 30 days. Any histological subtype of childhood cancer qualifies for entry into this study. Participants must speak English and have access to a telephone for participation. It is important to mention that individuals who have contraindications for using NRT, and those who smoke less than 5 cigarettes per day, have allergy to nicotine, or women who are pregnant, breastfeeding or planning to become pregnant within the next 2 months are eligible to participate in this study, but do not receive NRT. This decision was made to reflect the "real world" nature of tobacco QLs in which QLs will take "all comers" for cessation. Table 1 shows detailed inclusion and exclusion criteria.

PROCEDURES

Recruitment and screening

To overcome the difficulties of reaching potential participants in this highly mobile and geographically dispersed population, we are adopting a combination of proactive (defined as strategies involving real-time interpersonal contact with the researcher) and reactive (defined as strategies without real-time interpersonal contact with the researcher) recruitment techniques. These strategies have been shown consistently to enhance recruitment in smoking studies [51–58]. The proactive approach includes recruitment from three very large data sets of CCSs. First, we are proactively recruiting through the Childhood Cancer Survivors Study (CCSS), which is a multi-institutional collaborative project and the single most comprehensive body of information ever assembled on the long-term health status of childhood cancer survivors. Second, we are proactively recruiting through the St. Jude Lifetime Cohort Study (SJLIFE), which is a lifetime cohort of approximately 3000 childhood cancer survivors used for the investigation of the multi-factorial etiology of adverse health outcomes in aging adults surviving pediatric cancer. Third, we are also proactively recruiting through the St. Jude After Completion of Therapy Clinic (ACT), which provides comprehensive medical services to evaluate late treatment toxicities for over 12,000 pediatric cancer survivors. The reactive recruitment approach includes advertising through television, radio, newspaper, press conferences, internet, and mailings. However, telephone recruitment through the CCSS is serving as the primary method of recruiting participants into the study where the CCSS Coordinating Center and Survey Research Facility are assisting study administration.

CCSS participants identified as smokers are mailed study invitation letters. This letter introduces them to the study and notifies them that a member of the QL team will contact them to provide additional information and assess their interest in participation. After a period of approximately two weeks, an initial telephone screening interview is conducted to give potential participants a detailed description of the study and to assess their interest in participating. Individuals declining participation are encouraged to quit smoking, counseled regarding the benefits of quitting and given a list of nationally available cessation resources. For those who are interested, eligibility is confirmed, and then verbal consent, baseline measures, and contact information are obtained.

Randomization

Randomization is performed in blocks of size six to ensure that treatment assignment is balanced across groups over the enrollment period. After randomization, participants are contacted by phone and notified of their study group assignment. During this call, the informed consent and contact information are reviewed again. Participants in both interventions are provided the opportunity to begin the smoking cessation program immediately during this call. Should they choose to postpone it, they are encouraged to begin the program within the next 7 days.

After the phone call, participants assigned to the counselor initiated intervention are mailed; (1) a summary letter that contains an overview of the study, a written version of the informed consent, group assignment, an explanation of risks associated with participation, and assurance of confidentiality, (2) "Curbing your Cravings" brochure to provide them with detailed instructions regarding the proper use of NRT (patches & gum) and their side effects, and (3) a 4-week supply of nicotine patches followed by a second mailing of four additional weeks if they have successfully quit or have reset their quit date after one failure. Participants assigned to the participant initiated intervention receive the same information but a 2-week starter pack of nicotine patches, and are encouraged to purchase the patch for six additional weeks. They are also informed that they are qualified to call the toll-free telephone number of St. Jude Childhood Cancer Survivors Tobacco Quit Line at anytime between 7 a.m. and 9 p.m. Central Standard Time, Monday through Friday and they are provided with the QL number (1-800-4SJ-QUIT, or 1-800-475-7848). Finally, they are told that they have an eight week "window" and should call six times within that window (approximately one call every 10 days). Initial patch dose is tailored to participants' smoking rates based on the following algorithm, > 20 cigarettes/d (21 mg), 10–19 cigarettes/d (14 mg), and 5–9 cigarettes/d (7 mg). If a participant is initially placed on the 21 mg patch, the following dosing schedule is being used: 21 mg patch/day for 4 weeks, 14 mg patch/day for 2 weeks, 7 mg patch/day for 2 weeks, and then off. If a participant is initially placed on the 14 mg patch, the following dosing schedule is being used: 14 mg patch/day for 4 weeks, 7 mg patch/day for 4 weeks, and then off. If a participant is initially placed on the 7 mg patch, the following dosing schedule is being used: 7 mg patch/day for 8 weeks and then off. This dosing schedule provides eight weeks of exposure to the patch. Patch use begins at the day of the quit date.

Intervention format

The intervention integrates principles from two theories of behavior change, Social Cognitive Theory [59] and Social Determination Theory [60]. It reflects a strong focus on enhancing self-efficacy, modifying outcome expectancies, and developing effective self-regulatory skills. The intervention utilizes strategies to enhance self-efficacy for behavior change by providing opportunities for mastery experiences through short-term goal setting and helping participants alter cognitions associated with their perceived ability to successfully execute behaviors associated with cessation [61–63]. In addition, the intervention involves modifying outcome expectancies related to the targeted behavior changes in an effort to provide more accurate expectations regarding what they can expect to experience after quitting smoking. These include both positive (e.g., improved stamina, improved social image) and negative (e.g., nicotine withdrawal symptoms, weight gain) changes associated with abstinence. Finally, the intervention focuses on developing effective self-regulatory skills through strategies such as self-monitoring, goal setting, skills training, modeling, and self-reinforcement [64,65].

The behavioral smoking cessation intervention consists of six weekly, 15–30 minute individualized telephone counseling sessions that lead participants through three primary phases: (1) preparing to quit, (2) going through the quitting process, and (3) relapse prevention and maintaining short and long-term smoking abstinence. The "preparing to quit" phase

includes implementing smoking rate reduction strategies, breaking the cues related to smoking, engaging in a stop smoking "ritual" prior to quitting, and enhancing social support. The quitting phase includes setting a quit date and observing careful instructions regarding NRT use. Finally, the “relapse prevention” phase includes identifying high-risk situations and devising an individual relapse prevention plan to deal with slips and lapses (Fig. 2; Intervention Format). Participants in both interventions receive a maximum of 6 telephone counseling sessions and the intervention is discontinued at this point regardless of where they are in the cessation process (Fig. 3; Study Time-line and Procedures by Conditions).

Rate reduction intervention

Participants who slip or relapse are encouraged to set a new quit date as soon as possible. Participants who fail to quit smoking and decline to reset a quit date are given a rate reduction intervention. There is empirical evidence to suggest that rate reduction serves as a springboard to later cessation for individuals who are not ready to quit [66–69]. Research has shown that even in participants who are unable or not ready to quit, rate reduction may enhances the probability of cessation [70–71]. Therefore, supplemental rate reduction materials as well as nicotine gum are provided to these participants in hopes of increasing their ability to quit smoking in the future. Rate reduction strategies for these select participants include; switching to a low tar/low nicotine cigarette, reducing number of daily cigarettes by 60%, delaying the first cigarette of the day, monitoring their daily intake in comparison to their daily goal, carrying only the number of goal cigarettes each day, limiting smoking to only certain situations and certain times, and limiting access to cigarettes.

Follow-up and retention

All participants receive two follow-up calls at 8 weeks (post treatment) and 1 year after enrollment to assess their smoking status. Biochemical validation of smoking status via salivary cotinine analysis is obtained for those who report prolonged abstinence at 1 year. Biochemical measurement of smoking abstinence (e.g. salivary cotinine) in population-based studies is problematic as these studies enroll a large number of participants that are often widely dispersed in geography. Some studies have tried to validate cessation through the mail; unfortunately, this method has proven to be limited by high refusal and non-adherence rates in spite of monetary incentives (e.g., 44.3% adherence rate) [30]. A second limitation is uncertainly about the source of the returned saliva samples as one could argue that falsifiers might provide saliva from a nonsmoking family member or friend. To address this issue, we are using a strategy employed by the CCSS, which involves contracting with a nationwide reach private paramedical company, Examination Management Services, Inc. (EMSI) [www.emsinet.com/research.aspx], to obtain saliva samples from participants anywhere in the country at a convenient time and place (e.g., their home, workplace, or public place). This approach eliminates the inconvenience of having to travel to a clinic to provide a sample, and guarantees the source of the obtained sample. It also lessens the number of circumstances that may result in participants not responding to mailed sampling such as loss of test kits, misunderstanding directions, and general apathy.

To maintain active participation for the entire year of the study, extensive retention measures are being taken. These include; collecting names, addresses, and phone numbers for relatives/friends who would know the participant’s whereabouts; contacting participants with personalized letters and cards and remembering them at special occasions (e.g., birthdays, holidays); setting up a central file with names, addresses, phone numbers, and time windows of all participants; sending out a newsletter with project-relevant information twice a year; and taking an individual case management approach for handling difficult cases.

Interventionist training

All interventionists underwent an intensive full time three-week training period. This involved training in human subjects protection, motivational interviewing, behavioral theories, pharmacotherapies used in smoking cessation, health conditions in childhood cancer survivors, counseling protocol, quality control procedures, adverse events, and role playing of project procedures. The counselors meet twice a week for quality control, supervision, and case review.

Data collection, measures and outcomes

Data are collected at baseline, 8 weeks (post treatment) and 1 year after enrollment. At baseline, several demographic variables are collected, including age, height/weight, gender, marital status, income, occupation, years of education, and ethnicity. Several tobacco use/quitting variables are also collected at baseline including the number of years as a cigarette smoker, current amount smoked, attitudes toward quitting, prior cessation experience, and the Fagerström Test for Nicotine Dependence (FTND) [72].

NRT side effects and adverse events are monitored throughout the study. Concomitant medication use is monitored as it can affect cessation rates. For this same reason, participation in additional stop-smoking behavioral programs is carefully tracked. We also carefully track participant adherence to treatment sessions as well as patch use. This information will be used in secondary analyses to explore whether there is a relationship between adherence and cessation outcomes and whether differences in "intervention dose" account for some or all of the proposed increased efficacy of the counselor initiated condition.

Smoking status is evaluated at 8 weeks (post treatment) and 1 year after enrollment in both intervention conditions using both prolonged and 7-day point-prevalence abstinence criteria [73]. Prolonged abstinence refers to sustained abstinence following an initial grace period defined for purposes of this study as the two weeks immediately following a participants' quit date [73]. Point-prevalence abstinence refers to self-reported smoking status (yes vs. no) at a particular point in time, with no correction for previous or subsequent smoking status. Given that medical patients are at risk for underreporting their smoking status [48,50], we are validating self-reported abstinence at 1-year assessment using salivary cotinine analysis <15ng/ml [74]. Participants who report abstinence but refuse to provide a saliva sample, will be coded as smokers.

Sample size

Power estimates are based on detecting a difference in cotinine-validated self-reported smoking abstinence at 1-year follow-up using unadjusted proportions, which is a conservative approach to powering cessation trials. As the only published study of smoking cessation in childhood cancer survivors yielded a 6% difference between treatment and control [48], we believe that we can replicate this 6% difference with a well-validated counselor initiated QL, NRT supplementation, and a motivated medically at risk population. Still, given the paucity of data on childhood cancer patients from randomized trials, we chose to be conservative and powered the study to detect a difference of 5% in cotinine-validated self-reported smoking abstinence between the counselor initiated and participant initiated conditions. Based on these assumptions and using a two-sided significance level of $\alpha=0.05$ and 80% power, we calculated sample sizes assuming a 5% quit rate in the participant initiated group and a 10% quit rate in the counselor initiated group, we would need approximately 474 participants per intervention arm or about 950 total.

DATA ANALYSES

Two preliminary analyses will be conducted. First, to enhance participation and reach of our intervention in the future based on CONSORT-RE-AIM approach [75], we will initially compare differences in the characteristics (e.g., demographics, smoking history, nicotine dependence) of smokers who agree to participate in our study with those who decline participation using descriptive statistics for the nominal variables [chi-square (X^2) or Fisher's exact test] and t-test or a Mann-Whitney test for continuous variables, as appropriate. Second, using logistic regression and classifying all study participants as completers or lost to follow-up, we will explore which variables, if any, are associated with missing data. Most important is to investigate whether there is an association between dropout rate and the two study interventions (counselor initiated and participant initiated).

The primary analysis for which the study is powered involves comparing the difference between the two interventions in the self-reported prolonged abstinence and cotinine-validated point-prevalence abstinence at 1-year follow-up. Consistent with the intent-to-treat analyses, all eligible randomized participants will be included in the primary analysis, and thus, any participant who fails to be evaluated one year after enrollment will be included as a smoker. Another analysis will be conducted to assess the difference in point prevalence of abstinence at two time points of interest (8 weeks and 1 year). Two-way categorical analyses using X^2 statistics for categorical variables and analysis of variance for continuous variables will be used to assess the relationships between smoking cessation and the potential independent predictors, including demographic and medical history factors, smoking history, nicotine dependence (FTND), and intervention conditions. A logistic regression model predicting cessation will be developed using all variables from the bivariate analyses with statistical significance at the $P<0.05$ level. A final parsimonious model will include only significant variables and effect modifiers. All two-way interactions will be examined for significance in this final model.

We will also conduct secondary analyses to account for dose of treatment (NRT use plus number of QL contact) vs. success (quit for one year response) independent of treatment assignment. For this analysis we will ignore intervention assignment and look at two factors that might influence the two primary outcomes (self reported prolonged abstinence and cotinine-validated point-prevalence abstinence). The two factors, regardless of treatment assignment, are use of NRT during the eight weeks post randomization (yes vs. no) and number of QL contacts during the 8 weeks treatment period. For this latter variable, a participant will score from 0 to 6, with six meaning at least one contact with the QL in each of the weekly sessions. Ideally, a participant assigned to the counselor initiated intervention would get a "yes" for NRT and a score of six for QL contacts. A participant assigned to the participant initiated group could also have a yes response for NRT use and a score of six for QL contacts if they purchased and used NRT beyond the 2 week supply, and contacted the QL six times during their treatment period. We will also track how much NRT is used by participants to determine if there is a "dose" effect between degree of use and outcome.

Discussion

This paper describes the design of the St. Jude Cancer Survivors Quit Line (SJCSQL) study, which aims to evaluate the long-term (1-year) efficacy of a counselor initiated QL versus a participant initiated QL with adjunctive NRT in both groups among smokers who had cancer as children. Given the scarcity of evidence about the efficacy of QLs among childhood cancer survivors and that QLs have enormous dissemination potential in this geographically dispersed population, we believe that this randomized controlled trial will be the first to provide evidence for the efficacy of an intensive counselor initiated QL with provided NRT in childhood cancer survivors.

There are several important strengths of the SJCSQL study. In designing the study, we opted for a real-world comparison group, in which participants in the participant initiated intervention will have information about NRT and access to it as an over-the-counter medication. This study also involves a large sample size that will be recruited nationally, and thus will be sufficiently powered to detect the study outcomes, as well as be conducive to generalization. In addition, the outcome data will be analyzed using the intention-to-treat principle so that the study findings will be conservative.

As previously mentioned, to overcome the difficulties in reaching potential participants in this highly mobile and dispersed population, we are utilizing a combination of proactive and reactive recruitment strategies. This will allow us to test the effectiveness of each recruitment strategy, identify the characteristics of CCS smokers that affect their likelihood of participation, and determine whether tobacco QLs are as effective for directly enrolled participants as for those who call on their own. As such, this study will guide future work on the best way to approach and reach this population in order to improve the intervention dissemination and success.

The issue of biochemical validation in smoking cessation studies is still an important one. This is due to the difficulty and cost of obtaining and analyzing biological samples, and the presence of different views on the necessity of obtaining biochemical validation [50]. Some researchers believe that participants will typically underreport their level of cigarette consumption and recommend reliance on biochemical measures [76,77] while others favor the use of self-report and trust its validity [78,79]. Still, studies have demonstrated that certain subgroups have shown high rates of falsification, one of which is high risk medical patients [50]. In the only known smoking cessation study in childhood cancer survivors [48], abstinence rates were not biochemically validated. In order to overcome this shortcoming, we opted to obtain biomedical validation of smoking status in this study. This will guide future studies among CCSs and other high risk medical groups in terms of whether it is necessary to use biochemical validation, a procedure with great cost and labor implications.

Finally, it is important to note that the present study has the potential for immediate dissemination. Following the completion of this study, if the program is proven efficacious, St. Jude Children's Research Hospital is committed to disseminating this program as part of its outreach activities. In conclusion, we believe that the present study will address several key questions and provide important insights on the future of smoking cessation QL studies in CCSs and other medically compromised populations.

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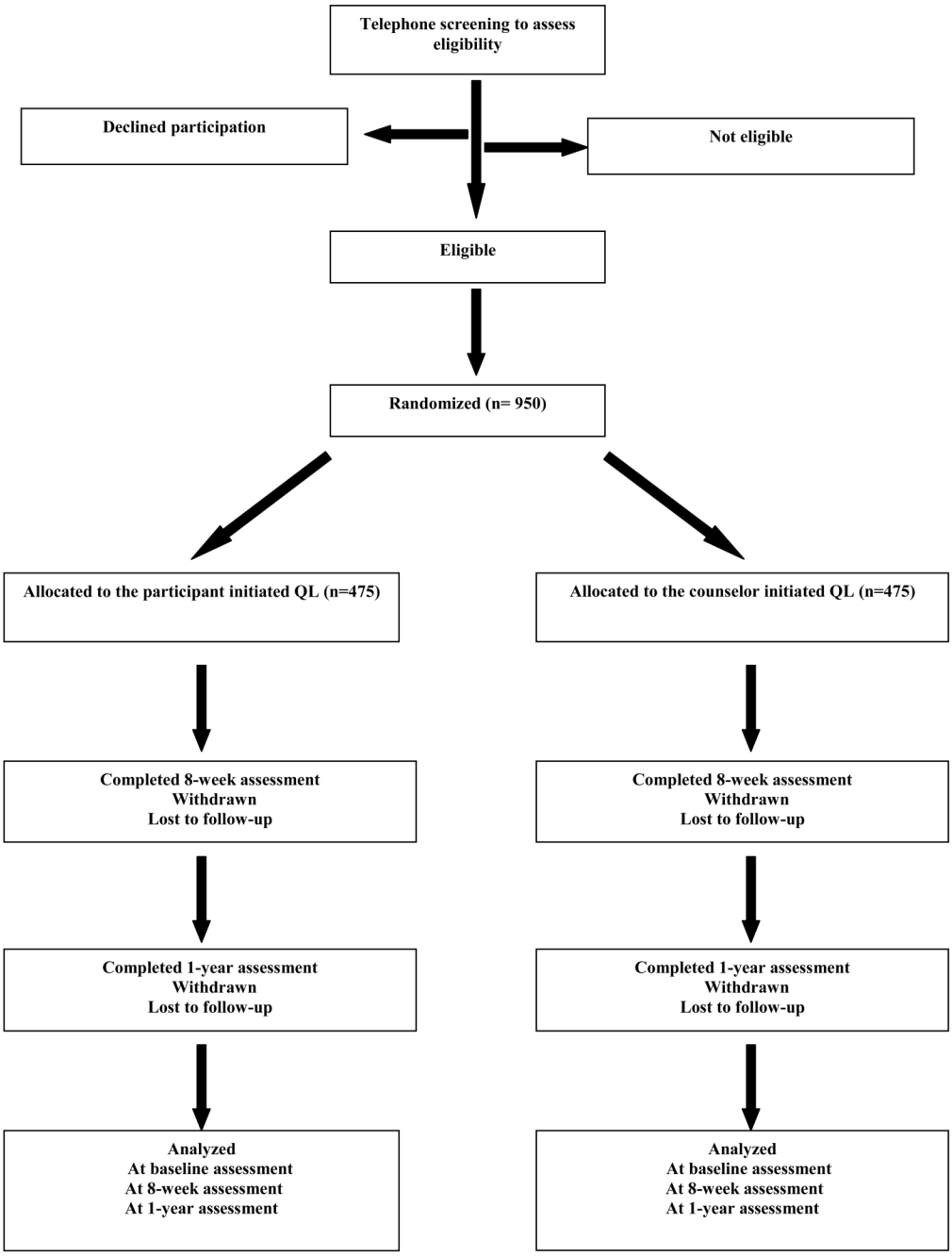

Fig. (1).
Study Flow.

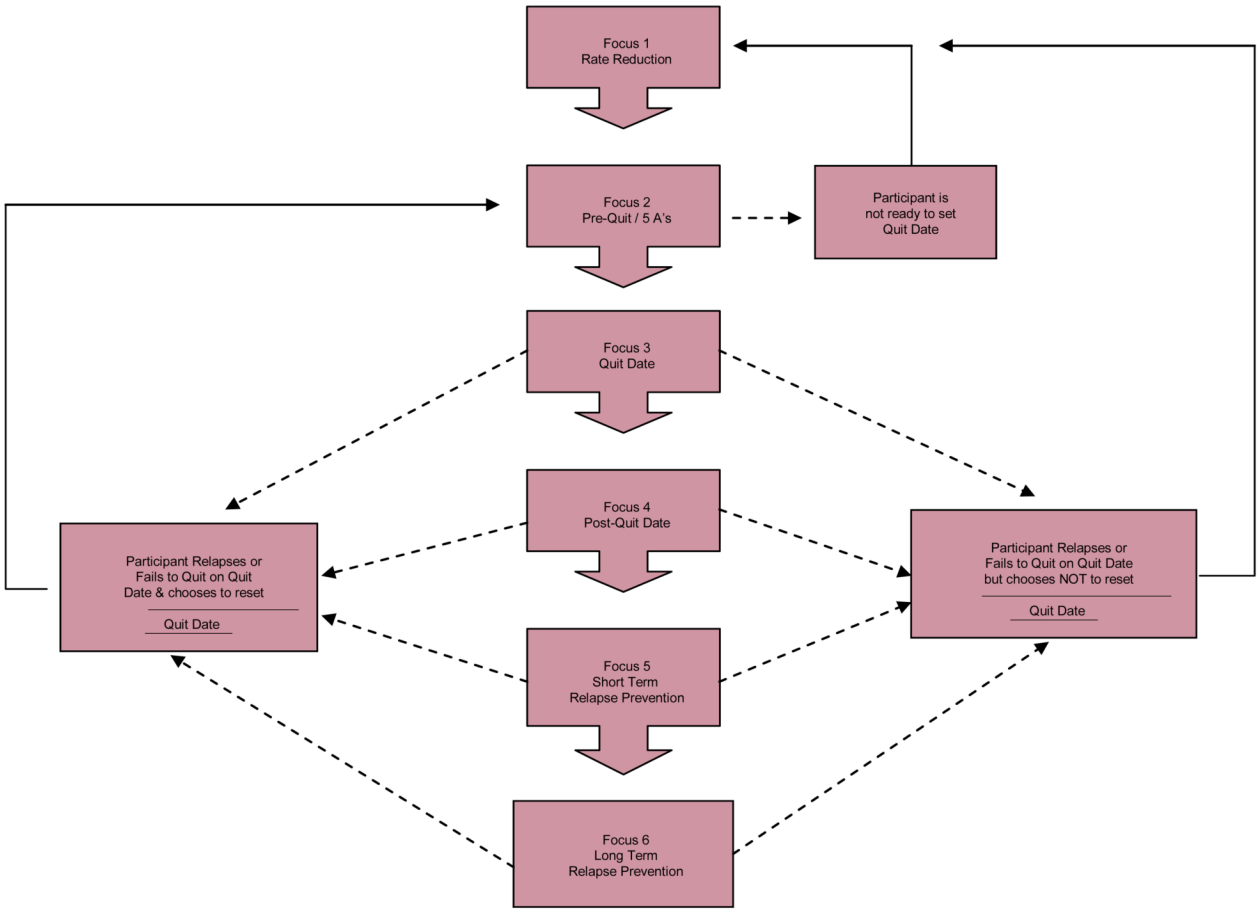

Fig. 2.
Intervention Format.

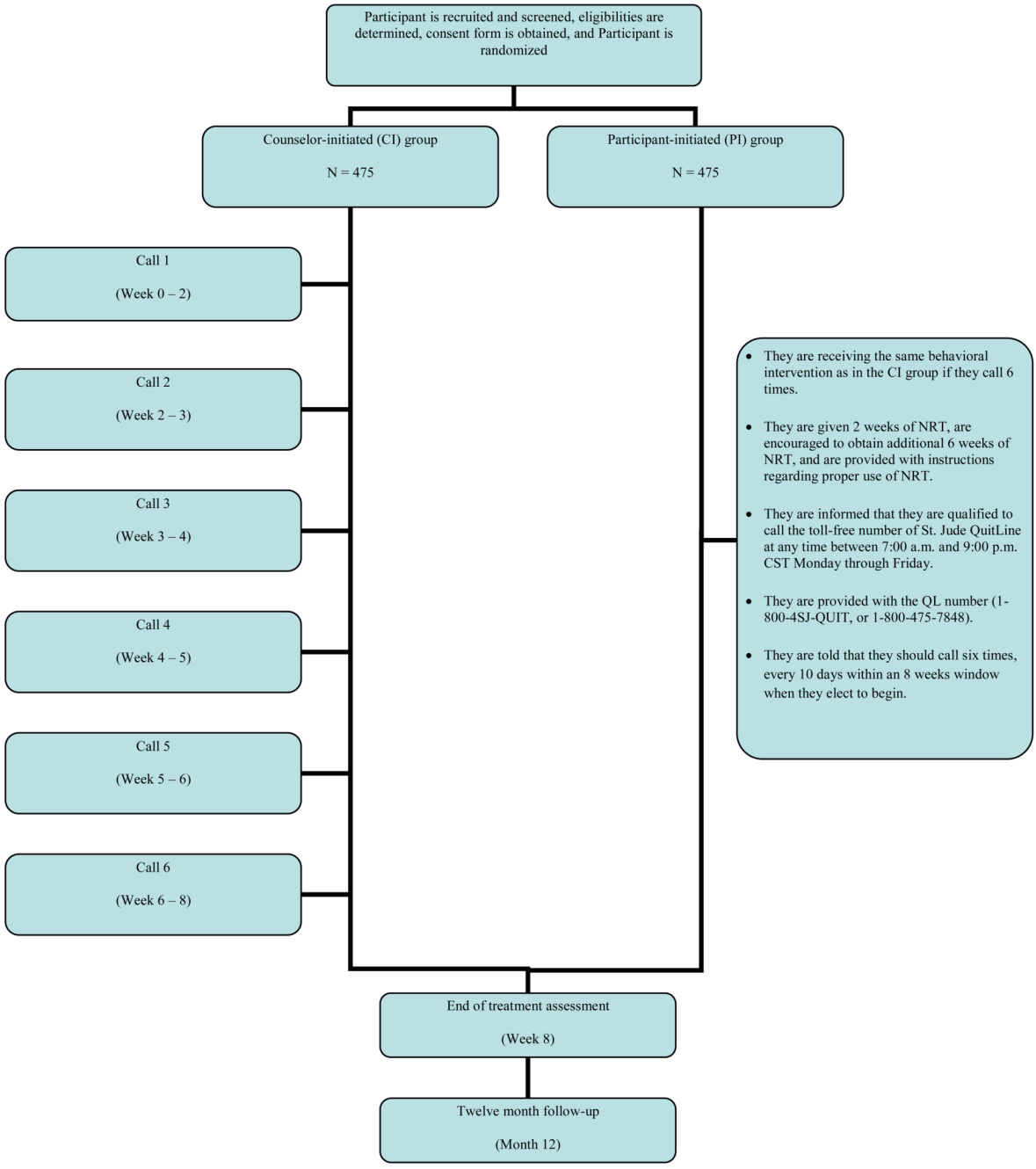

Figure (3).
The study time-line and procedures.

Table 1

Inclusion and Exclusion Criteria.

Inclusion criteria for participating in the study	**Exclusion criteria for using NRT**
Cancer diagnosis before age 21	Smoke fewer than 5 cigarettes per day
At least one year from active cancer treatment	Women who are pregnant, breastfeeding, or planning to become pregnant within the next two months.
Age 18 or older	Allergy to nicotine
Speaks English	**History of:**
Has telephone access	Myocardial infarction
Ability to understand consent procedures	Unstable angina
	Cerebrovascular incident
	Severe arrhythmias
	Vascular disease
	Phaeochromocytoma
	Diabetes
	Hyperthyroidism
	Abnormal kidney or liver function
	Gastritis or peptic ulcers