Study Title: Monetary Incentives to Promote Engagement with the Oklahoma Tobacco Helpline in Counties Experiencing Persistent Poverty

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RESEARCH PROTOCOL

Title of Project: Monetary Incentives to Promote Engagement with the Oklahoma Tobacco Helpline in Counties Experiencing Persistent Poverty

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Abstract

Nearly 20% of all cancers and more than 80% of lung cancers in the U.S. are attributable to smoking.[1] Research has highlighted elevated cancer mortality rates in U.S. counties experiencing persistent poverty (≥20% living in poverty for the past 30 years).[2] In Oklahoma, 16 counties meet the persistent poverty criteria.[2] Within these counties, smoking prevalence ranges from 19% to 32%, which is higher than the national smoking prevalence rate of 14%.[3] Smoking may be a primary contributor to elevated cancer mortality rates in these counties. Incentivizing treatment engagement and smoking abstinence is a promising approach for reducing smoking rates and tobacco-related cancers. The proposed pilot project is designed to evaluate the feasibility and potential efficacy of offering small financial incentives for the completion of smoking cessation counseling among Oklahoma Tobacco Helpline (OTH) callers living in persistent poverty counties (PPCs). The study will enroll 250 adults who reside in any of the 16 persistent poverty counties in Oklahoma, who are seeking smoking cessation treatment through the OTH. Participants will be randomly assigned to OTH care *or* OTH plus escalating incentives (OTH+I) for completing up to 5 counseling calls over 8 weeks.Feasibility outcomes for the incentives-based intervention will focus on counseling call completion, follow-up assessment completion, , and perceptions of the intervention. Potential effectiveness will be evaluated by comparing self-reported abstinence rates at 12 weeks post-enrollment in OTH+I relative to OTH alone.

A. Specific Aims

Aim 1. To evaluate the feasibility of offering financial incentives for tobacco helpline counseling call completions and smoking abstinence among OTH callers who reside in Oklahoma PPCs.
Hypothesis: The feasibility of the incentives intervention will be evaluated based on several metrics including counseling call completion rates (≥3 completed), follow-up assessment completion rates (≥75%), smoking cessation rates at the 12-week follow-up (≥25% biochemically-verified 7-day point prevalence abstinence), incentive costs, and positive perceptions of the intervention.

Aim 2. To evaluate the potential efficacy of OTH+I relative to OTH alone.
Hypothesis: Individuals randomly assigned to the OTH+I will complete more counseling calls and achieve higher rates of biochemically-verified abstinence at the 12-week follow-up than those assigned to OTH alone.

The current study will generate preliminary data for a full-scale research proposal to evaluate the impact of offering a financial incentives program for OTH callers with the goals of increasing smoking cessation treatment uptake and cessation rates in PPCs, and reducing tobacco-related cancer incidence and mortality.

Note, the original study protocol planned to gather biochemically-verified abstinence using carbon monoxide breath samples. Due to a technical difficulty, breath samples will not be gathered from participants and study staff will gather self-reported smoking status. Upon data analysis, the research team will take the above specified aims to evaluate the feasibility of and need of gathering biochemically-verified abstinence in such interventions.

B. Background and Significance

Smoking prevalence rates are disproportionately high among adults of low SES,[4] and socioeconomic disadvantage is associated with a reduced likelihood of smoking cessation.[5-10] The incidence of lung cancer, a disease primarily caused by smoking, is far greater among those with less education and those living in poverty relative to their higher socioeconomic status (SES) counterparts.[11,12] Although individuals of lower SES are just as likely to initiate quit attempts, they are less likely to succeed.[13] Likewise, smoking cessation interventions for low-SES adults have produced very low abstinence rates at follow-up.[14-17] Treatment approaches are needed to target socioeconomically disadvantaged people specifically and to reduce barriers to smoking cessation.

Contingency Management (CM). CM, or the tangible reinforcement of abstinence and other related outcomes (e.g., via financial incentives), is highly effective for promoting drug and alcohol abstinence among individuals with substance use disorders (see reviews [18-20]). CM interventions are based on behavioral principles and operant conditioning.[21,22] Specifically, outcomes associated with desired consequences (i.e., positive reinforcement) are more likely to recur. A recent meta-analysis concluded that there is strong evidence that offering financial incentives for smoking abstinence is an effective smoking cessation treatment that maintains its effect well beyond the discontinuation of incentives.[23]The findings of other two meta-analyses have indicated that financial incentives are associated with greater odds of behavior change for a variety of behaviors, particularly among low-SES individuals,[24, 25]and incentives may be particularly appealing in this group.[26,27] Notably, Mundt et al.[28] demonstrated that incentivizing both helpline counseling calls and biochemically-verified smoking cessation among Medicaid recipients improved biochemically-verified cessation rates after six months relative to a non-incentivized control group, and that the cost-effectiveness of the intervention compared favorably with other treatments. Dr. Kendzor (program leader) has demonstrated evidence of the efficacy of a low-cost incentives-based intervention relative to standard care (SC; counseling and pharmacotherapy) among homeless shelter residents[29] and safety net hospital patients.[30] Preliminary findings from Dr. Kendzor's ongoing randomized trial of a an incentives-based intervention for socioeconomically disadvantaged adults are extremely promising with 13% (SC) vs. 35% (SC + Incentives) biochemically-verified as abstinent at 12 weeks post-quit-date (*N*=235; R01CA197314).

Need for Cancer Control Program in PPCs. PPCs include counties where ≥20% of the population has been living in poverty for the past 30 years.[2] PPCs have cancer mortality rates that are significantly higher than counties experiencing current, but not persistent, poverty and those that are neither experiencing current nor persistent poverty.[2] This pattern of elevated cancer mortality is also observed for specific types of cancer, including lung/bronchus and others. Notably, PPCs are concentrated in

several rural areas of the U.S., including the southwest and great plains, in counties that overlap with tribal lands and that also have large non-White populations.[31]

Persistent Poverty in Oklahoma. There are sixteen counties in Oklahoma that meet the criteria for persistent poverty (see Table 1).[2] Rural-Urban Continuum Codes (RUCCs) are used to classify counties from 1 (most urban) to 9 (least urban), with codes 1-3 indicating metro areas and codes 4-9 indicating non-metro areas. The PPCs in Oklahoma have RUCCs between 2 and 9, and residents of PPCs in Oklahoma represent about 9.4% of the total population of the state (i.e., 371,206 people live in PPCs). Thus, cancer prevention and control programs targeting PPCs in Oklahoma must reach individuals who live in the least urbanized areas of the state (and country). Another unique characteristic of Oklahoma PPCs is the significant overlap with tribal lands.[33] Oklahoma PPCs have an overall population that is about 32% non-white, including 19%American Indian/Alaska Native [AI/AN]) residents.[34] The proportion of AI/AN within each Oklahoma PPC is sizable, with all but four counties reporting AI/AN populations of 16.1% to 46.1%, compared with the AI/AN population in the state overall of 9.4%.[34] See Table 1.

Table 1. Characteristics of Persistent Poverty Counties in Oklahoma.

PPC[3,4]	Tribal Land	Population (2019)[34]	American Indian/Alaska Native, % (2019)[35]	RUCC[34]	Smoking, % (2018)[36]*	Cancer Incidence, (age adjusted, per 100k; 2018)[37]**	Cancer Mortality, (age-adjusted, per 100k; 2018)[37] ***	Tobacco Helpline Enrolled (past year)
Adair	Cherokee	22,194	46.1	6	32	566.1	203.8	211
Caddo	Kiowa-Comanche-Apache	28,762	25.5	6	25	714.4	293.3	136
Cherokee	Cherokee	48,657	36.4	6	27	585.5	254.8	262
Choctaw	Choctaw	14,672	18.5	7	29	770.4	245.4	81
Greer	Choctaw	5,861	4.0	7	19	463.8	206.2	38
Harmon	N/A	2,653	3.2	9	21	750.8	375.4	8
Haskell	Muscogee (Creek)	12,687	17.7	6	21	797.3	276.3	68
Hughes	Choctaw-Creek	13,279	20.4	7	28	404.9	225.0	78
Johnston	Chickasaw	11,085	16.1	9	26	685.0	210.1	63
McCurtain	Choctaw	32,832	17.1	7	27	626.9	275.2	267
Okfuskee	Creek	11,993	22.0	6	29	611.7	314.1	78
Payne	Pawnee-Sac and Fox- Iowa	81,784	5.4	4	19	443.7	154.8	301
Pushmataha	Choctaw	11,096	19.3	9	27	662.0	250.5	63
Seminole	Seminole	24,832	20.1	7	21	467.9	272.6	162
Sequoyah	Cherokee	41,569	22.5	2	25	806.2	269.6	207
Tillman	Kiowa-Comanche-Apache	7,250	5.1	6	24	544.4	258.6	29
OVERALL	**-**	**371,206**	**18.9 (median)**	**2-9**	**25.5 (median)**	**618.8**	**255.4**	**2,052**

*The national smoking prevalence rate was 14.0% in 2018.[4] **The national age-adjusted cancer incidence rate was 450.5 per 100k (2014-2018).[38]
***The national age-adjusted cancer mortality rate was 155.5 per 100k (2014-2018).[38]

Cancer Incidence and Mortality. In 2018, cancer incidence in Oklahoma PPCs was exceptionally high at 618.8 cancers per 100,000 people,[37] compared to cancer incidence rates of 450.5 nationally[38] and 572.6 statewide.[37] Thus, the Oklahoma PPC cancer incidence rate is 37% and 8% higher than national and statewide incidence rates, respectively. Likewise, the cancer mortality rate in Oklahoma PPCs is 255.4 per 100,000 people,[37] compared with cancer mortality rates of 149.0 nationally[37] and 213.6 in Oklahoma overall.[37] ***That is, cancer mortality in Oklahoma PPCs is 71%and 20%higher than the national and state cancer mortality rates, respectively.*** Finally, the PPC incidence and mortality rates for respiratory cancers specifically, are 104.3 and71.3, respectively[37], relative to rates 50.8 and 34.8 nationally (105%

and 105% higher in PPCs, respectively)[38] and 84.5 and 59.3 statewide (23% and 20%higher in PPCs, respectively).[37] These *extreme disparities* in cancer incidence and mortality in Oklahoma *require immediate and focused attention*.

Smoking. Nearly 20% of all cancers and more than 80% of lung cancers in the U.S. are attributable to cigarette smoking.[1] Thus, smoking cessation is key to reducing cancer incidence and mortality. Although smoking rates in the U.S. have declined to 14.0%,[3] smoking prevalence remains far higher among Oklahoma adults overall (20%),[36] AI/ANs (29.3%), and those earning <$35,000 per year (27%).[3] Among those who reside in Oklahoma PPCs specifically, the smoking rates are exceptionally high, ranging from 19% (Greer and Payne county) to 32% (Adair county), with a median smoking rate of 25.5%.[36] In order to reduce cancer incidence and mortality in PPCs, it is imperative that individuals who reside in these areas have accessible and effective smoking cessation interventions available to them. Because smoking is a leading cause of cancer, this proposal will focus on addressing high rates of smoking in Oklahoma PPCs. Specifically, this proposal will evaluate the feasibility and efficacy of a high impact incentives-based treatment delivered via the OTH that includes telephone counseling and nicotine replacement therapy (NRT), with the addition of small monetary incentives for completing counseling calls and demonstrating biochemically-confirmed abstinence at follow-up.

C. Preliminary Studies/Progress Report

The current proposal involves a partnership between Dr. Darla Kendzor, an investigator with a research focus on tobacco cessation intervention in socioeconomically disadvantaged adults, and Dr. Jon Hart, the Director of the OTH which serves the entire state, including the 16 Oklahoma counties experiencing persistent poverty.

Darla Kendzor, Ph.D. (Program Leader) is an Associate Professor in the Department of Family and Preventive Medicine at the University of Oklahoma Health Sciences Center (OUHSC), Co-Director of the TSET Health Promotion Research Center (HPRC),[39] and Co-Leader of the Cancer Prevention and Control Program at the NCI-Designated Stephenson Cancer Center (SCC).[40] Dr. Kendzor has two ongoing NCI-funded randomized controlled trials focused on evaluating incentives-based tobacco cessation interventions for socioeconomically disadvantaged adults (R01CA197314, R01CA251451). She has published extensively on tobacco use and cessation in socioeconomically disadvantaged and vulnerable populations (e.g.,[17, 29-30, 41-45]).

Jon Hart, Ph.D. (Program Co-Leader) is an Assistant Professor in the OUHSC Department of Pediatrics and Director of the OTH. Dr. Hart is an affiliate of the HPRC, and he offices at the HPRC in order to facilitate communication and collaboration between the HPRC and the OTH. Dr. Hart oversees the state helpline contract with Optum, which is the OTH operator.

Mark Doescher, MD (Co-investigator) is a Professor in the Department of Family and Preventive Medicine, and Associate Director of Community Outreach and Engagement at the NCI-Designated SCC. Dr. Doescher is an affiliate of the TSET HPRC, and he offices at the HPRC to facilitate communication and collaboration. Dr. Doescher's research focuses on rural and tribal health, including tobacco use (e.g.,[46-50]). He will assist with rural and tribal outreach and recruitment efforts.

Summer Frank-Pearce, Ph.D. (Co-Investigator) is an Assistant Professor in the OUHSC College of Public Health, within the Department of Biostatistics and Epidemiology and a member of the TSET HPRC. She has a history of tobacco-focused and other collaborations with Dr. Kendzor (Program Leader).[43, 51-55] She will provide biostatistics support for the study.

D. Research Design and Methods (What, When, How, Where)

Study Overview. The proposed randomized controlled trial will enroll 250 adults who are seeking smoking cessation treatment through the OTH and who reside in any of the 16 PPCs in Oklahoma. Participants will be randomly assigned to OTH *or* OTH plus escalating incentives (OTH+I) for completing up to 5 counseling calls over 8 weeks. Feasibility outcomes for the incentives-based intervention will focus on counseling call completion, follow-up assessment completion, smoking cessation, incentive costs, and perceptions of the intervention. Potential effectiveness will be evaluated based on comparisons of counseling call completions at 12 weeks post-enrollment (4 weeks after incentives have ended) in OTH+I relative to OTH alone.

Randomization Plan. Randomization will be stratified by sex (male vs. female), race/ethnicity (White vs. non-White), and cigarettes smoked per day (≤10 vs. >10).

Interventions. Eligible OTH callers will be randomly assigned to one of two treatment groups: OTH or OTH+I. OTH care will include up to 5 counseling calls with a Tobacco Treatment Specialist and eight weeks of NRT. Note that an additional 6 weeks supply of NRT will be provided beyond the 2-week supply typically offered by the OTH to ensure that all participants receive adequate pharmacotherapy. OTH+I will include all components of OTH care plus escalating incentives for completing up to 5 counseling calls over 8 weeks (at least one week apart).Based on the incentive schedule used in our current (PI: Kendzor, R01CA197314) and past research,[29,30] incentives will start at $20 for completing the first call, and will increase by $5 for each consecutive call completed until the 5th call is completed (i.e., up to $40 may be earned for completing the 5th call). The incentive will reset to $20 if a call is missed (i.e., not completed within 2 weeks of the prior call). OTH treatment group participants may receive up to $140 and OTH+I treatment group participants may receive up to $290.
Contingency Management (CM). CM participants will receive counseling and nicotine replacement therapy (as described above). They will receive financial incentives for completing counseling calls.

Measurement of Abstinence.
Participants enrolled prior to May 19, 2022 who self-report smoking abstinence at 8 weeks post enrollment will receive the abstinence payment of $50 as specified in the initial study application. Because breath samples will not be gathered as specified in the initial protocol, these participants may not receive the $20 breath sample payments. Participants who are enrolled after May 19, 2022 will follow the payment schedule as outlined above in the protocol (payments for questionnaires, incentive group will also receive payments for counseling calls), and the payments for breath samples will be removed. In total, the standard care group will be eligible for up to $140. In total, the standard care plus financial incentives group will be eligible for $290.

Measures. Participants will be asked to complete a web-based Research Electronic Data Capture (REDCap)[56,57] assessment upon enrollment to assess sociodemographic characteristics and tobacco use history, and again at 4-, 8- and 12-weeks post-enrollment to assess self-reported smoking status and perceptions of the intervention. Participants will be compensated $50 for the baseline assessment and $30 for each of the following assessments. The number of completed counseling sessions will be documented (data provided by Optum), as well as follow-up completion rates at 8- and 12- weeks post-enrollment. Participants will be compensated via Greenphire reloadable study credit card.

Data Loss Prevention. Phones will be programmed to connect to our secure server 4 times daily to upload encrypted data, to overcome the potential loss of data if participants lose or change phones, which has rarely occurred in our previous research. This strategy will also allow the staff to monitor participant survey completion rates and call participants when this rate is low. Importantly, assessment data are password protected and encrypted. Thus, study data are only accessible by the research team. Data will be remotely deleted from lost phones and one replacement phone will be provided.

Disclosure of Results to Participants. Study results will not be disclosed to participants.

Future Use of Data. Identifiers might be removed and the de-identified information may be used for future research without additional informed consent from the subject.

E. Chart Review

This protocol does not involve a chart review. However, please note that participants will be required to disclose some sociodemographic information and tobacco history to determine eligibility and to identify differences between eligible and ineligible participants including address, age, phone, sex, ethnicity, race, and ethnicity. All information will be stored in a REDCap database.

F. Biospecimens

No biospecimens will be collected as part of this protocol.

G. Banking/Repository/Database

Questionnaire and expired carbon monoxide, will be collected and stored via REDCap and the INSIGHT mobile health platform. No biospecimens will be stored.

H. Inclusion / Exclusion Criteria

Interested participants may be included in the study if they: 1) contact the OTH seeking smoking cessation treatment, 2) reside in any of the 16 PPCs in Oklahoma (Adair, Caddo, Cherokee, Choctaw, Greer, Harmon, Haskell, Hughes, Johnston, McCurtain, Okfuskee, Payne, Pushmataha, Seminole, Sequoyah, Tillman), 3) report smoking ≥ 5 cigarettes per day, 4) are ≥ 18 years of age, 5) are able to provide a copy/photo of their ID/driver's license or other documentation of identity and residence (i.e., residence in a PPC must be established), 6) be able to read, speak, and understand English, and 7) have no contradictions for NRT. Participants will be excluded if they do not meet these inclusion criteria. Participants will not be terminated from the study. Note, participants who are currently enrolled in the Tobacco Treatment Research Program (IRB 6951) and other Health Promotion Research Center related studies may be excluded from enrolling in this study due to the possibility of conflicting medication dosages. Staff will verify enrollment via Redcap. Note, participants cannot enroll in the study after initial completion.

Inclusion of Pregnant Women. The findings of a recent Cochrane review suggests that NRT may be an

effective smoking cessation treatment for pregnant women.[36] There has been no evidence of serious adverse events associated with NRT among pregnant women,[36] and NRT does not appear to impact birth outcomes.[37] In contrast, continued smoking during pregnancy is associated with adverse outcomes including preterm delivery, small size for gestational age, and childhood overweight.[38] The American College of Obstetricians and Gynecologists (ACOG) advises that NRT may be used with supervision, after a discussion with the patient about the risks of continued smoking and the possible risks of NRT.[39] Although we do not expect many individuals who are pregnant to participate in the study, they will not be excluded from participation. Following completion of informed consent and study enrollment, the following safeguards will be employed for pregnant women: 1) approval will be sought from the participant's obstetrician/physician to offer NRT, 2) the participant's personal physician will be notified when the patient has been provided with NRT, and 3) NRT side effects will be tracked and monitored using REDCap, by the Tobacco Treatment Specialists (counselors) and the Oklahoma Tobacco Research Center Staff. The staff physician will be automatically notified in real-time via encrypted email when moderate/severe side effects are endorsed, and the physician will then follow-up with the participant to obtain additional information and to provide guidance. At the discretion of the staff physician, the participant's personal physician may also be notified of the side effects/symptoms. This process will allow the participant's physician to offer guidance and follow-up to their patient regarding their use of NRT during the pregnancy at regular prenatal visits, and potential side effects/adverse events will also be tracked and addressed as part of the study. Non-pregnant participants will be advised to refrain from becoming pregnant while participating in the study, and pregnancy status will be assessed during screening and again at 4 and 8 weeks post-quit. Physician approval for NRT will be sought in cases where a participant becomes pregnant.

I. Gender/Minority/Pediatric Inclusion for Research

The study has no inclusion/exclusion criteria based on gender or race/ethnicity. The current study focuses only on adults who are 18 years of age and older (no maximum age). Children <18 years of age will be connected with the appropriate alternative resources through the Oklahoma Tobacco helpline. Separate smoking cessation interventions designed for children are warranted and preferable as the smoking characteristics and cessation-related needs of children and adults are likely to be very different.

J. Recruitment and Enrollment

Recruitment. Adults who meet the eligibility criteria as specified above in the inclusion/exclusion criteria will be recruited for the study. Participants who contact the OTH from eligible counties will be asked about their interest in participating in this study. If interested, individuals will be screened for eligibility at the time of contact and their information will be forwarded to study staff to reduce barriers to enrollment. Eligible and interested participants will consent via electronic signature using REDCap or by the use of a physical consent form. The OTH presently advertises to Oklahomans through a variety of modalities (e.g., television, social media). However, to increase awareness of the OTH social media and traditional advertising approaches including print and advertising will be employed as needed.

Retention. We will use several strategies that have been successful in our prior research efforts to retain participants in the study. Participants will be sent assessment reminder messages via phone, text, email, and mail. Study staff will closely follow the schedules of each participant, and attempt to contact participants who miss study assessments. Participants will be compensated separately for the completion of web-based assessments, and counseling completions. Participants may earn up to $290.

Informed Consent. Individuals will be provided with information about their treatment options and study by OTH staff. Staff will provide an oral overview of the consent form, and individuals will have the opportunity to have their questions answered. Participants will be advised that participation is voluntary, and made aware that other treatment options are available to them if they do not wish to participate. Written informed consent will be obtained by sending an electronic copy or by sending a physical copy to participants. Participants will review the consent form and sign electronically via REDCap or physically. Participants will be mailed or emailed a copy. Those who are not interested or eligible will be offered the standard OTH treatment offered to all adults, or they may be referred to smokefree.gov or the OUHSC Tobacco Treatment Research Program (TTRP).

K. Risks and Benefits

Potential Risks. Study data will not be de-identified, given that information such as names, study assessment dates, and contact information will be required for participant contact and data analysis. Participation in this study poses minimal risk to participants. However, one potential, although unlikely, risk to participants is loss of confidentiality. The severity of harm in the case of loss of confidentially may range from mild to severe depending upon the individual and the specific circumstances. Side effects from NRT (nicotine patches, gum, lozenges) are possible, though adverse experiences are usually mild in nature. Potential risks arising from use of nicotine patch therapy include nausea, erythema, and other dermatologic reactions.

Protections against Risk.

General Protections. Each participant will be assigned an identification number that will be utilized in place of names in all electronic and print data files. The file containing the links between participant names and identifiers will be kept in a separate password-protected file, which will be destroyed 12 months after the completion of the study. All print information will be stored in a locked filing cabinet at the OUHSC. Electronic data will be maintained on the investigators/staff computers, and all computers will be password protected. Participants will complete questionnaires that can only be accessed with a password through the web-based REDCap program. Project staff will complete extensive training focused on each of the following topics: 1) project rationale and objectives, 2) the informed consent process, 3) general data collection procedures (e.g., computer data collection, privacy), and 4) measurement of CO and data.

Nicotine Replacement Therapy. Adverse experiences associated with the nicotine replacement therapy are almost always mild in nature. Potential risks arising from use of nicotine patch therapy are mostly limited to nausea, erythema, and other dermatologic reactions. The incidence of side effects with the patch is small and can be locally treated or reversed with discontinuation of the patch. The risk of nicotine toxicity is extremely low. Appropriate warnings about not smoking while using the patch will be issued each time patches are dispensed. Management of AE's are done in accordance with standards of clinical practice and almost always are relieved by a reduction in dose, or although rarely necessary, discontinuation of NRT.

Potential Benefits. Potential benefits to patients include the provision of an evidenced-based treatment for tobacco cessation (counseling + NRT) to increase the chances of successful smoking cessation. In addition, the knowledge gained from this study may be utilized to improve our understanding of tobacco cessation treatments, especially among disparate populations. Such information may facilitate the development of more effective tobacco cessation interventions that may be utilized within cessation clinics and programs**.**

Risks in Relation to Benefits. The possible risks of participation in this study are minimal and reasonable in relation to benefits. The health benefits gained from participation in a tobacco cessation intervention far outweighs the risks of continued tobacco use.

L. Multiple Sites

Data collection will occur remotely via telephone, and web- and smartphone-based surveys from the OTH and the OUHSC.

M. Statistical Methods

In our previous research, smoking abstinence rates were 14% vs. 33% for SC (counseling + pharmacotherapy) and SC plus incentives, respectively, at the 12 week post-quit-date follow-up in safety net hospital patients,14 and preliminary findings are similar at 12 weeks post-quit-date (13% vs. 35%, N=235) in our ongoing randomized controlled trial (PI: Kendzor; R01CA197314). Assuming a two-sided alpha of 0.05, a sample of 250 participants (80 per group) will offer 80% power to detect an 18% difference in cessation rates between OTH and OTH+I at the 12-week follow-up if we assume abstinence rates of 12% vs. 30%. This sample size would also offer 80% power to detect a small effect size of intervention group (OTH vs. OTH+I) on the number of counseling calls completed (0-5 calls possible).

Feasibility (Aim 1). The feasibility of offering treatment-related incentives via the OTH will be evaluated based on several metrics including the total number of counseling calls completed (0-5 possible), with the goal of achieving an average ≥3 completed counseling calls, and a follow-up rate of ≥75% based on follow-up rates in our previous[30] and ongoing trial (PI: Kendzor; R01CA197314). As in other CM studies,[60,62,66,67,68] an intent-to-treat approach will be used in which participants who do not demonstrate biochemical verification of abstinence will be classified as smoking (i.e., *no need to account for loss to follow-up*). We will characterize intent-to-treat smoking cessation rates at the 12-week follow-up, with the goal of achieving ≥25% biochemically-verified 7-day point prevalence abstinence in the incentives group. Participant perceptions of the intervention will be characterized, as well as the costs associated with counseling- and abstinence-contingent incentives.

Potential Efficacy (Aim 2). Logistic regression analyses will be conducted to evaluate the influence of OTH vs. OTH+I on biochemically-confirmed 7-day point prevalence smoking abstinence (binary) at 12 weeks (primary outcome) post-enrollment which is 4 weeks after incentives have ended. Linear regression analyses will be conducted to evaluate the influence of treatment group on the number of counseling calls completed. However, if the number of counseling calls completed is not normally distributed, we will explore the use of other models such as Poisson, negative binomial, or zero-inflated models. Covariates in the analyses may include age, sex, race/ethnicity, nicotine dependence, insurance status, annual household income, and/or educational attainment.

Note, the original study protocol planned to gather biochemically-verified abstinence using carbon monoxide breath samples. Due to a technical difficulty, breath samples will not be gathered from participants and study staff will gather self-reported smoking status. Upon data analysis, the research team will take the above specified aims to evaluate the feasibility of and need of gathering biochemically-verified abstinence in such interventions.

N. Data and Safety Monitoring Plan

The Program Leaders (Kendzor, Hart) will be responsible for all data monitoring and for compliance with all federal and OUHSC IRB policies and procedures for monitoring progress, safety, reporting of unanticipated problems or adverse events, and assuring actions resulting in suspension of the study are reported.

Because this proposal reflects a pilot/feasibility study, a formal Data Safety and Monitoring Board (DSMB) is not required. The program leaders will be responsible for monitoring rates of enrollment, risks of participation, protocol adherence by the research team, safety and confidentiality of data collection, data entry, and statistical issues. Relevant unanticipated problems, adverse events, or participant concerns will be reviewed by the program leaders. The OUHSC IRB will be informed of any findings. All modifications to the protocol will be submitted for IRB approval. Changes to or errors in the protocol will be promptly disseminated to study personnel via e-mail, and retraining procedures will be implemented as needed. Appropriate modifications will be made in consultation with the designated program person at the National Institutes of Health if necessary.

Unanticipated problems. For all protocols conducted at the OUHSC, the PI is required to submit to the IRB within five (5) university business days of discovering any unanticipated problems (both internal and external) involving risks to participants and others.

Serious adverse events. A serious adverse event is defined as follows: death, a life-threatening adverse event, inpatient hospitalization or prolongation of existing hospitalization, a persistent or significant disability/incapacity, a congenital anomaly/birth defect, or a medically significant event. Risks of participation will be continually monitored and appropriate measures implemented in cases of unforeseen adverse events. If a serious adverse event occurs, the study PI (Kendzor) will notify the IRB and the designated program person at the National Institutes of Health (if funded) in writing. These events will be reported regardless of whether they appear to be related to study procedures. Given the non-invasive, minimal risk nature of the proposed research, we anticipate no serious adverse events related to the interventions or the study procedures.

Adverse Experiences Associated with Nicotine Replacement Therapy. Individuals who report a medical condition that precludes the use of nicotine replacement therapy (NRT; e.g., recent heart attack, uncontrolled hypertension) will be excluded from the study. The incidence of side effects with NRT is low and can be locally treated or reversed with discontinuation of the patch. The risk of nicotine toxicity is extremely low. Management of adverse events are done in accordance with standards of clinical practice and almost always are relieved by a reduction in dose, or although rarely necessary, discontinuation of NRT use.

Adverse Experiences Associated with Nicotine Abstinence/Withdrawal. Participants may also experience nicotine abstinence/withdrawal effects. These effects may include irritability, difficulty concentrating, insomnia, anxiety, dysphoria, and increased hunger. None of these effects results in serious adverse events.

Data Quality and Integrity. Because of the ongoing monitoring of the project, study investigators and staff will maintain quality assurance procedures for all data. The Insight™ platform, developed by the mHealth Shared Resource, will be used to collect all CO measurements. The Insight™ platform has two primary components: a web-based Content Management System (Insight-CMS) and an Insight-app (a shell in smartphones). Insight™ is a secure platform and is designed to comply with all HIPAA regulations. Data may also be collected via REDCap, which is a secure web database, and sent to OUHSC servers using the OUHSC secure file transfer system. The servers are password protected and

backed up regularly. The data and referral information will only be accessible to the study investigators and staff.

Several procedures will be used to maintain the integrity of the data. All participants' information or responses will be temporarily saved on password-protected, encrypted smartphones or tablets. When there is active connection, encrypted data will be automatically sent to our OUHSC mHealth Shared Resource secure servers multiple times per day. Access to all databases are limited to specific users at the discretion of the MPIs. Additional quality assurance procedures will include a data collection protocol documented in a protocol manual, and regular meetings among the investigators and project staff to review problems and solutions and discuss concerns.

O. Data Sharing

Data storage, or data transfer if there is a request, will follow all OUHSC's requirements for data security. In all components of the research project, participants will be assigned unique identification numbers, and this identification numbers will be used in all data transfer and data analysis. De-identified data files may also be transferred on a password-protected and encrypted drive and will be maintained on institutional servers with appropriate antivirus software. Final de-identified data files will be maintained by the PI (Kendzor) at OUHSC.

P. Confidentiality

The Insight™ platform, developed by the OUHSC/SCC mHealth Shared, will be used collect expired carbon monoxide at follow-up. The Insight™ platform has two primary components: a web-based Content Management System (Insight-CMS) and the Insight-app (a shell in smartphones). Insight™ is a secure platform and is designed to comply with all HIPAA regulations. Questionnaire data will be collected via REDCap, which is a secure web database, and sent to OUHSC servers using the OUHSC secure file transfer system. The servers are password protected and backed up regularly. The data and referral information will only be accessible to the study investigators and staff.

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