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Short communication

Preliminary evaluation of a telephone-based smoking cessation intervention in the lung cancer screening setting: A randomized clinical trial

Kathryn L. Taylor[a,*], Charlotte J. Hagerman[a], George Luta[b], Paula G. Bellini[a], Cassandra Stanton[a,c], David B. Abrams[a,d], Jenna A. Kramer[e], Eric Anderson[e], Shawn Regis[f], Andrea McKee[f], Brady McKee[f], Ray Niaura[a,d], Harry Harper[g], Michael Ramsaier[g]

[a] Lombardi Comprehensive Cancer Center, Georgetown University, Washington, DC, United States
[b] Department of Biostatistics, Bioinformatics, and Biomathematics, Lombardi Comprehensive Cancer Center, Georgetown University, Washington, DC, United States
[c] Behavioral Health Group, Westat, Inc., Rockville, MD, United States
[d] The Schroeder Institute for Tobacco Research and Policy Studies, Truth Initiative, Washington, DC, United States
[e] Medstar Georgetown University Hospital, Washington, DC, United States
[f] Sophia Gordon Cancer Center, Lahey Hospital and Medical Center, Burlington, MA, United States
[g] John Theurer Cancer Center, Hackensack University Medical Center, Hackensack, NJ, United States

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ABSTRACT

Incorporating effective smoking cessation interventions into lung cancer screening (LCS) programs will be essential to realizing the full benefit of screening. We conducted a pilot randomized trial to determine the feasibility and efficacy of a telephone-counseling (TC) smoking cessation intervention vs. usual care (UC) in the LCS setting. In collaboration with 3 geographically diverse LCS programs, we enrolled current smokers (61.5% participation rate) who were: registered to undergo LCS, 50–77 years old, and had a 20+ pack-year smoking history. Eligibility was not based on readiness to quit. Participants completed pre-LCS (T0) and post-LCS (T1) telephone assessments, were randomized to TC ($N = 46$) vs. UC ($N = 46$), and completed a final 3-month telephone assessment (T2). Both study arms received a list of evidence-based cessation resources. TC participants also received up to 6 brief counseling calls with a trained cessation counselor. Counseling calls incorporated motivational interviewing and utilized the screening result as a motivator for quitting. The outcome was biochemically verified 7-day point prevalence cessation at 3-months post-randomization. Participants (56.5% female) were 60.2 (SD = 5.4) years old and reported 47.1 (SD = 22.2) pack years; 30% were ready to stop smoking in the next 30 days. TC participants completed an average of 4.4 (SD = 2.3) sessions. Using intent-to-treat analyses, biochemically verified quit rates were 17.4% (TC) vs. 4.3% (UC), $p < .05$. This study provides preliminary evidence that telephone-based cessation counseling is feasible and efficacious in the LCS setting. As millions of current smokers are now eligible for lung cancer screening, this setting represents an important opportunity to exert a large public health impact on cessation among smokers who are at very high risk for multiple tobacco-related diseases. If this evidence-based, brief, and scalable intervention is replicated, TC could help to improve the overall cost-effectiveness of LCS.
Trial registration: NCT02267096, https://clinicaltrials.gov

1. Introduction

The National Lung Screening Trial (NLST) reported a 20% lung cancer mortality reduction following low-dose computed tomography (LDCT) screening [1]. As a result, LDCT is recommended for individuals at high-risk for lung cancer [2]. If widely adopted, LDCT

* Corresponding author at: Department of Oncology, Cancer Prevention and Control Program, Lombardi Comprehensive Cancer Center, Georgetown University Medical Center, 3300 Whitehaven St., NW, Suite 4100, Washington, DC 20007, United States.
E-mail address: TAYLORKL@georgetown.edu (K.L. Taylor).

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screening is estimated to prevent 12,000 U.S. lung cancer deaths annually [3]. To maximize the health benefit from LDCT screening, the Centers for Medicare and Medicaid Services (CMS) mandated that all smokers undergoing screening must receive cessation assistance [4]. Although there are multiple cessation interventions with proven effectiveness [5], presently none have demonstrated efficacy in the lung cancer screening (LCS) setting [6].

Providing cessation interventions in conjunction with LCS may capitalize on the 'teachable moment,' when smokers may be especially amenable to considering quitting [7,8]. The goal is to leverage increased motivation that may be provided by an abnormal screening result and to counteract the potential for reduced motivation following a normal result [9]. This setting provides a unique opportunity to motivate smokers to quit by incorporating the LDCT result.

There have been four randomized cessation trials conducted within LCS programs, each reporting promising cessation rates, but with null findings [10–13]. Building on our prior work [9,14–16], we evaluated a scalable telephone counseling (TC) cessation intervention to provide a personalized, intensive intervention in which the LCS result is leveraged to enhance motivation. TC has demonstrated effectiveness among older smokers [5,17–21], smokers who are not ready to quit [22–32], and non-treatment seeking smokers [29,33], making it an important intervention to test in this setting. In a randomized clinical trial, we hypothesized that TC would yield higher quit rates than usual care.

2. Material and methods

2.1. Participants

Based on the National Comprehensive Cancer Network's (NCCN) screening criteria [34], eligible screening participants were 50–74 years old with a 20+ pack-year smoking history. Current smokers were registered for screening at three sites (Table 1). Neither readiness to quit nor number of cigarettes per day (CPD) were eligibility criteria.

2.2. Procedure

Between November 2013 and March 2016, each screening site invited smokers to learn more about this study when scheduling their LDCT appointment (Fig. 1). Georgetown University Medical Center (GUMC) interviewers called to describe the study to eligible individuals, obtain verbal consent, and conduct the baseline interview (T0) prior to screening. Each site's IRB required a mailed information sheet explaining study procedures, participant rights, and potential risks, but did not require signed consent forms.

Following participants' receipt of their screening results, interviewers conducted the T1 telephone interview and random assignment. During the T1 interview, participants read the letter describing their screening results to the interviewer. The final telephone interview (T2) was conducted 3-months post-randomization.

2.3. Measures

2.3.1. Background characteristics

We assessed demographic and clinical characteristics (Table 1).

2.3.2. Tobacco use

We assessed smoking history, CPD, non-cigarette tobacco use, nicotine dependence [35], and readiness to quit [36–40], (i.e., those ready within the next 30 days/next six months were "ready to quit" vs. "not ready to quit").

Table 1
Baseline demographic, tobacco, and lung screening characteristics.

	Usual care (*N* = 46)	Telephone counseling (*N* = 46)
Demographic characteristics		
Site		
Georgetown University Med Ctr	7 (15.2%)	7 (15.2%)
Lahey Hospital and Med Ctr	33 (71.7%)	35 (76.1%)
Hackensack University Med Ctr	6 (13.0%)	4 (8.7%)
Gender		
Female (*N*, %)	27 (58.7%)	25 (54.3%)
Age (mean, SD)	60.1 (5.7)	60.4 (5.1)
Median (range)	59.5 (50-70)	60.0 (51-73)
Marital status		
Married/marriage-like relationship (*N*, %)	20 (43.5%)	19 (41.3%)
Race		
White	43 (93.5%)	43 (93.5%)
African-American	3 (6.5%)	2 (4.3%)
Native American	0 (0%)	1 (2.2%)
Education		
≤HS graduate	12 (26.1%)	19 (41.3%)
Some college	20 (43.5%)	14 (30.4%)
≥College Grad	14 (30.4%)	13 (28.3%)
Employment		
Not employed	8 (17.4%)	5 (10.9%)
Full-time/part-time	18 (39.1%)	23 (50.0%)
Retired	14 (30.4%)	13 (28.3%)
Other (disability)	6 (13.0%)	5 (10.9%)
Tobacco-related comorbidities		
0	10 (21.7%)	16 (34.8%)
1	18 (39.1%)	17 (37.0%)
2+	18 (39.1%)	13 (28.3%)
Health insurance status *N* (% yes)	46 (100%)	45 (97.8%)
Personal history of Ca[a] *N* (% yes)	12 (26.7%)[b]	12 (26.7%)[b]
Family history of lung Ca *N* (% yes)	16 (34.8%)	20 (44.4%)[b]
Alcohol use		
Non-drinker	15 (34.1%)[c]	13 (28.9%)[b]
Monthly or less	6 (13.6%)	6 (13.3%)
2–4 times a month	7 (15.9%)	7 (15.6%)
2–3 times a week	9 (20.5%)	10 (22.2%)
4+ times a week	7 (15.9%)	9 (20.0%)
Tobacco use characteristics		
Pack years (mean, SD)	50.3 (20.4)	43.8 (23.7)
Median (range)	45.0 (26–100)	40.0 (23–165)
Nicotine dependence[d,e] (*M*, SD)	4.6 (2.0)	4.1 (1.9)
Cigarettes per day[e]		
≤10	10 (22.7%)	12 (27.9%)
11–19	10 (22.7%)	14 (32.6%)
20	14 (31.8%)	11 (25.6%)
≥21	10 (22.7%)	6 (14.0%)
Past 30 days – other tobacco products		
Pipe, tiparillos, smokeless tob.[e]	0 (0%)	0 (0%)
Cigars[e]	2 (4.5%)	2 (4.7%)
Electronic cigarettes[f]	7 (17.1%)	2 (4.8%)
Readiness to quit[e]		
Not ready to quit	22 (50.0%)	25 (58.1%)
Ready to quit-next 6 mos	9 (20.5%)	5 (11.6%)
Ready to quit-next 30 days	13 (29.5%)	13 (30.2%)
Lung screening characteristics		
Screening history (% yes)	22 (47.8%)	18 (39.1%)
Screening result[g]		
Normal	21 (45.7%)	24 (52.2%)
Minor abnormality/not susp for LC	16 (34.8%)	13 (28.3%)
Suspicious for lung cancer	9 (19.6%)	9 (19.6%)

[a] Cancers: breast, skin, prostate, bladder, colorectal, Hodgkin's lymphoma, kidney, thyroid, cervical, liver, testicular, throat.
[b] Missing: *N* = 1.
[c] Missing: *N* = 2.
[d] Fagerstrom test for nicotine dependence [35].
[e] Missing *N* = 5.
[f] Missing *N* = 9.
[g] Screening result categories are based on the NLST categories, with categories 2 and 3 collapsed due to small sample sizes in the 'minor abnormality' group.