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Pilot study of a video intervention to reduce anxiety and promote preparedness for lung cancer screening

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ABSTRACT

Background: Lung cancer screening (LCS) with low dose computed tomography (LDCT) is associated with a 20% reduction in lung cancer mortality. Psychological burden is a potential harm associated with LCS, and is a major barrier to utilization. We aimed to examine the feasibility and acceptability of a video intervention designed to reduce anxiety and promote psychological preparedness of LCS.

Patients and methods: This is a two group, sequential enrollment pilot study of a video intervention that integrates information on screen criteria, procedures, benefits and harms, and follow-up plan. Participants were enrolled 1–2 weeks prior to baseline LDCT, and the intervention was administered in one in-person session on the day of LDCT. Outcomes were assessed at baseline (pre-screen), immediately after LDCT, and at 1 week, 3 months, and 7 months post-screen. Outcome measures included the SF-12 (HRQOL), STAI (anxiety), psychosocial consequences of LCS (COS-LC), risk perceptions for lung cancer, and a satisfaction tool. The student's *t*-test was used for exploratory evaluations on change from baseline scores both within and between groups.

Results: Sixteen participants (8 intervention, 8 controls) enrolled and completed the study (61.5% retention). Participants in the control group reported a significantly increased sense of dejection at 1-month and 7-months post-screen as measured by the COS-LC ($p = 0.01$). Participants were highly satisfied with the intervention.

Conclusion: A video intervention that promoted psychological preparedness for LCS was feasible to implement as part of an LCS program and highly accepted by participants.

1. Introduction

Lung cancer is the most common cause of cancer death in the United States and worldwide. [1] Outside of a lung cancer screening program, only about 20% of lung cancers are detected at stage I when cure is likely, and almost all of these are detected incidentally. [2] Evidence from several national lung cancer screening trials, including the Early Lung Cancer Action Program (ELCAP), and the NCI-sponsored National Lung Screening Trial (NLST) supports the benefits of low-dose computed tomography (LDCT) in the early detection of lung cancer. [3,4] Lung cancer screening (LCS) with LDCT may reduce lung cancer mortality in up to 65% of high-risk current and former smokers. [3] These studies have led to the U.S. Preventative Services Task Force (USPSTF) recommendation endorsing LDCT in current and former smokers aged 55–80 who have a 30 pack-year smoking history and currently smoke or have quit within the past 15 years. [5]

Psychological burden is one of the LCS-related harms highlighted by current screening guidelines. [6,7] Given the high rates of false-positive results from LDCT (39.1% had at least one false positive) [8], understanding the impact and magnitude of potential screen-related psychosocial consequences is particularly important. Most LCS trials, including those conducted in the United States and Europe, assessed patient-reported outcomes (PROs) on health-related quality of life (HRQOL), anxiety, and distress. In a recent systematic review of psychological burden associated with LCS, we found that LCS may result in short-term psychological distress for individuals with positive or indeterminate scan results. [9] Individuals with higher perceived risk of lung cancer experienced higher levels of distress. [9,10] Overall HRQOL did not substantially change over time or differ by LDCT results. [9,10]

There has been extensive study on mammography-related anxiety, with some studies reporting psychological burden lasting several years from false positive exams, although most anxiety resolved once additional testing is performed to establish a diagnosis. [11] There is little data on the magnitude of prolonged uncertainty and anxiety associated with LCS beyond a clinical trial setting. [12,13] Wiener et al evaluated

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the psychological impact of undergoing surveillance for indeterminate pulmonary nodules, and found that sources of distress include fear of cancer, concerns with the screening process, guilt associated with tobacco use, and uncertainty associated with screen result and potential work-up. [14–17] Other factors may also impact HRQOL and anxiety in LCS. Current recommendations for screening targets high-risk populations of current and former smokers. By nature of these risk factors, the current screening population is likely to have co-morbidities, such as pulmonary and cardiovascular illnesses, that may already influence their HRQOL. [18] Screen-related anxiety is especially important among smokers, a population with higher rates of mental illness compared with non-smokers. [19] In the NELSON trial, current smokers reported higher levels of anxiety and lower HRQOL. [20–22] Other factors, including how providers communicate cancer risk and the follow-up plan to patients, may strongly influence distress. [15]

Psychological burden can potentially occur at any step of the ``screening cascade," with heightened anxiety at specific time points such as receiving scan results. [6,9] Given that LCS is currently recommended for smokers, a population that is already at risk for psychological issues, interventions to provide information on risk, benefits, and follow-up plans after LCS may improve patient-centered outcomes and mitigate potential screen-related psychological burden. [10] While a number of shared decision making tools have been developed to facilitate patient education on LCS, there is insufficient information on whether providing LCS education reduces anxiety in patients undergoing LCS. The purpose of this study was to pilot-test a scalable video intervention to promote psychological preparedness for LCS and to determine the effect of this intervention on anxiety.

2. Patients and methods

2.1. Study and intervention design

This was a two-group, sequential-enrollment feasibility study of a video-intervention to prepare patients for LCS. The intervention, *Preparing for Lung Cancer Screening,* uses a multimedia approach to provide patients with quality information related to benefits of LCS, risks for lung cancer, LCS procedures, follow-up plan for both positive and negative results, and risks of screening. The intervention content (**Table 1**) is delivered via a 5 min video and 9-page handbook. It covers information on the following: 1) LCS program team and contact information; 2) reasons for screening; 3) screening eligibility; 4) how screening is performed; 5) what to expect on the day of screening; 6) what to expect after screening; 7) what to expect if result is negative; 8) what to expect if result is positive; and 9) risks of screening. At our institution, patients receive verbal counseling and a trifold pamphlet on screening as their shared decision making consultation prior to obtaining a LDCT scan.

2.2. Sample and setting

Patients who were scheduled for a LDCT and English-speaking were eligible for participation in the study. We included individuals with no history of cancer who were referred to the LCS program for screening as well as individuals with a previous cancer diagnosis who were eligible for LCS based on established criteria. Participants were recruited from the LCS program of City of Hope, a National Cancer Institute-designated comprehensive cancer center. Study procedures and protocol were approved by the Institutional Review Board. All participants provided voluntary informed consent prior to enrollment.

Table 1
Preparing for lung cancer screening: intervention content.

- Program team and contact information
- Why get screened
- Who is eligible?
- How screening is performed
- What to expect on the day of screening
- What to expect after screening
- What to expect if result is negative
- What to expect if result is positive
- Risks of screening

2.3. Outcome measures

HRQOL was assessed using the *Medical Outcomes Study Short-Form 12 (SF-12)*. It contains 7 items that measures the following concepts: physical functioning, role functioning, bodily pain, energy/fatigue, social functioning, mental health, emotional functioning, general health perceptions, and changes in health. [23] Two validated subscales are derived from the 7 items: the physical component summary (PCS) and mental component summary (MCS) scores. The tool achieved a multiple R [2] of 0.91 in the prediction of PCS-36 and 0.92 in the prediction of the MCS-36. [23] The SF-12 scores were highly correlated with the MOS sample, with values of 0.904 and 0.939. [23] The SF-12 was able to reproduce variance of greater than 90% for the SF-26 measures in the general US population norm. [23] A higher score indicates better physical and psychological functioning. Mean scores of greater than 50 represents above average health status. The *State Trait Anxiety Inventory (STAI)* was used to assess distress/anxiety. The STAI include 20 items rated on a 4-point scale, with higher scores indicating greater anxiety (range 20–80). Internal consistency coefficients for the scale have ranged from 0.86 to 0.95; test-retest reliability coefficients have ranged from 0.65 to 0.75 over a 2-month interval. [24] A score of ≥ 40 indicates clinical anxiety. [25] For adults aged 50 to 69 years, the median norm is 34.5 for men and 32.2 for women. [26] Psychosocial impact of LCS was measured using the *Consequences of Screening in Lung Cancer (COS-LC)*. This tool is an adapted version of the Psychological Consequences Questionnaire (PCQ), a validated measure to assess the psychological impact of mammography screening. [27] The tool contains items and subscales assessing the psychosocial aspects of LCS (anxiety, sense of dejection, negative impact of LCS on behavior and sleep). [12] A higher score indicates more negative psychosocial consequences of LCS. [28,29] *Perceived Risk of Lung Cancer* was assessed using two five-point Likert scale items on the comparative and absolute perceived risk for developing lung cancer. [30] Participants who received the intervention completed a self-reported measure that assessed acceptability of the intervention. Outcomes were assessed at the following time points: a) T0 – 1 to 2 weeks before scheduled LDCT (sociodemographics, anxiety); b) T1 - immediately following LDCT (HRQOL, anxiety, psychosocial consequences of screening, perceived risk for lung cancer); c) T2 - 1-week post-screen (anxiety, psychosocial consequences of screening, satisfaction with intervention); and d) T3 and T4 - 3 and 7-months post-screen (HRQOL, anxiety, psychosocial consequences of screening).

2.4. Study procedures

Participants were sequentially-enrolled, with participants in the control group enrolled first, followed by the intervention group. Upon informed consent, participants completed baseline surveys before screening. Participants in the control group received usual care, which included routine visits and telephone contact with the LCS program nurse practitioner and coordinator. Participants sequentially enrolled in the intervention group received the intervention on the day of their scheduled LCS screen. Participants were instructed to arrive 1 h prior to their LDCT. The 5 min video was viewed via a tablet. After viewing, a handbook was provided to participants, key contents were reviewed, and questions answered. Participants were instructed to contact LCS program staff with questions.