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Patient–Physician Discussions on Lung Cancer Screening: A Missed Teachable Moment to Promote Smoking Cessation

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Abstract

Introduction: Little is known about whether patients and physicians perceive lung cancer screening (LCS) as a teachable moment to promote smoking cessation or the degree to which physicians in "real world" settings link LCS discussions with smoking cessation counseling. We sought to characterize patient and physician perspectives of discussions about smoking cessation during LCS.

Methods: We conducted a qualitative study (interviews and focus groups) with 21 physicians and 28 smokers screened in four diverse hospitals. Transcripts were analyzed for characteristics of communication about smoking cessation and LCS, the perceived effect on motivation to quit smoking, the degree to which physicians leverage LCS as a teachable moment to promote smoking cessation, and suggestions to improve patient–physician communication about smoking cessation in the context of LCS.

Results: Patients reported that LCS made them more cognizant of the health consequences of smoking, priming them for a teachable moment. While physicians and patients both acknowledged that smoking cessation counseling was frequent, they described little connection between their discussions regarding LCS and smoking cessation counseling. Physicians identified several barriers to integrating discussions on smoking cessation and LCS. They volunteered communication strategies by which LCS could be leveraged to promote smoking cessation.

Conclusions: LCS highlights the harms of smoking to patients who are chronic, heavy smokers and thus may serve as a teachable moment for promoting smoking cessation. However, this opportunity is typically missed in clinical practice.

Implications: LCS highlights the harms of smoking to heavily addicted smokers. Yet both physicians and patients reported little connection between LCS and tobacco treatment discussions due to multiple barriers. On-site tobacco treatment programs and post-screening messaging tailored to the LCS results are needed to maximize the health outcomes of LCS, including smoking quit rates and longer-term smoking-related morbidity and mortality.

Introduction

The National Lung Screening Trial showed that annual low radiation-dose computed tomography screening can reduce lung cancer death and all-cause mortality of middle-aged and older individuals with a substantial history of tobacco use,[1] with the lowest rate of lung cancer death observed among screened individuals who had successfully quit smoking.[1,2] Several guidelines recommend and the Centers for Medicare and Medicaid Services (CMS) require that health care practitioners offer smoking cessation counseling with lung cancer screening (LCS).[3,4] Since an estimated half of individuals undergoing LCS will be current smokers,[5] screening presents an opportunity to engage smokers in tobacco treatment, thus combining two interventions to reduce smoking-related morbidity and mortality.[3,4,6]

Research suggests that LCS may serve as a teachable moment to motivate smoking cessation.[7–9] Teachable moments are life transitions or health events that have potential to motivate behavior change because of greater receptivity to health risk messages during periods of heightened awareness.[10,11] However, some studies suggest that smokers believe that undergoing LCS yields similar health benefits as smoking cessation; LCS may paradoxically reduce smokers' motivation to quit.[12]

A better understanding of patient and clinician perceptions of current practice, needs, and preferences for smoking cessation counseling is essential to identify how LCS could serve as a teachable moment for smoking cessation. The goal of our study was to characterize perspectives of physicians and patients on communication about screening and smoking cessation, the degree to which communication of smoking cessation is integrated with LCS discussions, and the perceived utility of LCS discussions as a teachable moment for smoking cessation. We conducted this study at sites serving a lower-income, lesser-educated, and more racially diverse population compared to the National Lung Screening Trial cohort,[13] as it is particularly important to identify strategies to motivate smoking cessation among underserved smokers, who have a disproportionate risk of lung cancer,[14,15] and are less likely to utilize smoking cessation treatment.[16–19]

Methods

Between October 2013 and March 2015, we recruited patients from three Veterans Health Administration (VA) facilities as part of a larger study on implementation of LCS, randomly selecting patients screened in the prior year from each site's LCS registry. Among 143 patients invited, 37 participated in semi-structured interviews; 16/37 patients were current smokers at the time of LCS referral and were included in this analysis of smoking cessation discussions in the context of LCS. To increase patient diversity and learn physicians' perspectives, we collected a second wave of qualitative data between February and June 2016 at a large safety net hospital. We shifted from interviews to focus groups for patient participants for pragmatic reasons (pilot study with 6 months of funding) and because this method can be particularly effective for capturing beliefs of underrepresented groups.[20,21] We conducted two focus groups with a total of 12 patients (all current smokers randomly selected from the registry of patients who underwent LCS in the prior year) and semi-structured interviews with 21 physicians (a convenience sample of pulmonologists and primary care providers who refer patients to LCS). All sessions were audio-recorded and professionally transcribed.

We obtained ethical approval from the Institutional Review Boards at Boston University Medical Campus and the Edith Nourse Rogers Memorial Veterans Hospital to conduct this study. Potential patient participants were sent a letter with study information and an opt-out card. Those who did not return the opt-out card were contacted by phone to participate. On the call, the study coordinator (EK) explained the purpose of the research study and the salient elements of participation, and those who agreed to participate were scheduled a time for the interview or focus group at their convenience. For physician participants, the principal investigators (HK, RSW) gave a brief overview of the study at section meetings (pulmonary, internal medicine) and followed up with email invitations to participate in the study. All interviews and focus groups were conducted in-person at the participant's respective LCS site. A trained qualitative interviewer (EK, HK, JAC, RSW) obtained informed consent from participants immediately prior to initiating the interview/focus group. Patient participants and interviewers had no prior relationships. In some cases, interviewers were professional colleagues of physician interview participants. Patient participants received a $40 gift card and physician participants received a $50 gift card.

Patient interview guides were developed to explore patients' beliefs and attitudes, perceived benefits and barriers to quitting and how LCS, receipt of LCS results, and conversations with physicians about screening affected patients' motivation to quit smoking (Supplementary Appendix 1). We developed physician interview guides to gain insight regarding patient–physician conversations about smoking cessation and elicit suggestions about how to improve communication regarding tobacco treatment within the LCS context (Supplementary Appendix 1). Interviews queried perceived effects of LCS on smokers' motivation to quit, individual approaches to discussing LCS and tobacco treatment, and barriers and facilitators for leveraging LCS as a teachable moment.

Data were manually coded and analyzed using both deductive and inductive content analysis methods.[22,23] For deductive analysis, patient transcripts were reviewed and excerpts were mapped to constructs from the McBride[10] model, which describes the conditions necessary for a cueing event to be a teachable moment. The event must (1) increase perceptions of risk, (2) produce a strong emotional response, and (3) change the individual's self-concept or social role.[10,24] For inductive analysis, we performed unstructured coding of transcripts (patients and physicians) to allow for identification of new or unexpected themes. Separate codebooks were developed for patient and physician data. Codebooks (Supplementary Appendix 2) were iteratively revised until the team reached consensus on codes

and summary categories. The last level of analysis included finalization of conceptual categories and themes grouped in each category, and identification of specific quotes that best highlighted specific themes. At least two reviewers coded all transcripts in full (EK, HK).

Results

Table 1 shows characteristics of participants and sites. Our analysis revealed three dominant themes: (1) Perceptions of whether undergoing LCS and receiving screening results motivated smoking cessation; (2) Extent to which the topic "smoking cessation" was included in LCS discussions; (3) Physician-perceived barriers and proposed communication strategies that may facilitate smoking cessation counseling in LCS conversations. Perspectives from internists and pulmonologists did not differ by provider type; results are collectively reported as "physicians." We describe these themes in detail below, with supporting quotations identified by participant type (P = patient, C = clinician) and participant number.

Perceptions of LCS as a Teachable Moment to Motivate Smoking Cessation

Physician Perspectives

Physicians expressed mixed impressions as to whether the initial LCS conversation could be leveraged as a teachable moment to increase patients' motivation to quit. Some physicians believed that for smokers, the initial steps of discussing or undergoing LCS did not motivate change in smoking (Table 2): *"I don't think people are more likely to quit because I suggested they get screened or that they are screened" (C1)*. Other physicians, however, believed that offering LCS increases patients' perception of lung cancer risk and may serve as a teachable moment:

> "[If a patient thinks,] 'Oh gee, I'm in that category of high risk people that could have cancer, and it's worth doing a CT scan to screen me for it,' that probably makes an impression on people. Then as part of the same visit they're hearing me saying, not for the first time, 'You really need to quit smoking because of the risk of cancer.' I suspect they probably do put that together and maybe that has a bigger impact on them because now they're perceiving the risk is high enough that someone actually wants to do a CT scan" (C20).

By contrast, most physicians thought that receiving LCS results could affect smokers' motivation to quit, some believing that results could motivate quitting and others believing that it could hinder quitting. With regard to the former, several physicians thought a positive screening result could serve as a wake-up call to quit smoking: *"Sometimes if they get a result that's scary, they're receptive to quitting at that point" (C21)*. Some physicians thought that even a negative screening test could motivate smoking cessation if LCS revealed another smoking-related disease: "*I have patients who didn't have any nodules, but had severe emphysema on their CT and now they've quit smoking" (C2)*. On the other hand, some physicians feared that a negative screening test could decrease motivation to quit: "*There's probably a minority of patients who afterwards will lick their chops and say, 'oh everything was clear so I can go back to smoking'" (C16)*.

Patient Perspectives

There were patients from all sites who viewed LCS as an event that heightened their awareness of the harms of smoking. For some, it caused a powerful emotional response, leading them to rethink their smoking habit, consistent with the constructs of a teachable moment for smoking cessation (Table 2). For others, the impact of LCS on motivating smoking behavior change was mixed and often tied to LCS results (Table 2). Below we report the effect of LCS on each construct from the McBride model.

Redefining Self-Concept and Social Role

For some patients, LCS highlighted how smoking was inconsistent with their role as a caregiver and/or an individual committed to staying healthy:

> "I need to quit because I have grandchildren. I want to be around for them. I don't have too much wrong with my lungs, but they seen a couple of things on my lungs" (P11).
> "They said a little spot. I'm 65. I'd like to [live] a little bit longer. I never really tried [to quit] before. It wakes you up…I'm gonna try" (P1).

Activating Emotional Responses and Increasing Perception of Health Risks

Most patients expressed that undergoing LCS invoked strong emotions that motivated them to think about quitting smoking.

> "I smoke less. Because it scared me, going through the screening, and then doctors always say, quit smoking" (P13).

Impact of LCS on Motivation to Quit Smoking

A dominant theme from participants was that a positive screening result increased their motivation to quit smoking (Table 2).

> "We're going to keep an eye on it, every 6 months we'll have a new image just [to] see if it grows any, that's what they're worried about. I was concerned. I quit smoking and I felt good about that" (P18).

For some patients, even a negative screening test motivated them to cut down on smoking.

> "I had the test. It was negative. I was really surprised, because my mother died from lung cancer....I wasn't expecting a negative thing. I quit for a month and a half then" (P10).

By contrast, other patients acknowledged that screening did not affect their motivation to quit. In some cases, patients described other stressors in their life that kept them smoking:

> "The lung scan didn't really make any difference to me. Because I have depression. I have stress. …I don't think for me stopping's going to be an option…I think even if it came back positive, I think I would still smoke" (P3).

While all Veteran participants recognized smoking as a risk for lung cancer, some downplayed how their tobacco use, compared to military or other exposures, adversely affected their health. This tended to reduce the impact of positive LCS results on motivation to quit:

> "Surprised they only found one [nodule]. …I've worked in very dusty, smoky conditions, and…all that exhaust that I breathed, I'm sure that wasn't any better for me than my smoking. …[My doctor] got me some of that nicotine gum, which I just haven't started to use yet" (P16).

In some cases, LCS actually served to further entrench smoking behaviors. A minority of patients reported that finding nodules

Table 1. Characteristics of Lung Cancer Screening (LCS) Programs and Participants

	Site A	Site B	Site C	Site D
LCS program				
Hospital type	Large VA hospital	Large VA hospital	Medium VA hospital	Safety net hospital
Geographic region	Northeast	Northeast	South	Northeast
LCS program initiated	February 2012	June 2013	February 2014	March 2015
Patient participants (*n*)	5	4	7	12
Sex				
Male	4 (80%)	4 (100%)	7 (100%)	5 (42%)
Female	1 (20%)	0 (0%)	0 (0%)	7 (58%)
Clinician participants (*n*)				21
Internists				10 (48%)
Pulmonologist(s)				11 (52%)

Table 2. Perceptions of Lung Cancer Screening (LCS) as Motivating Smoking Cessation

Undergoing LCS or initial LCS discussion	
Teachable moment	**Not a teachable moment**
Illustrative physician quotes	Illustrative physician quotes
I suspect they do put that together and maybe that has a bigger impact on them because now they're perceiving that the risk is high enough that someone actually wants to do a CT scan. (C20)	*It's all related to stressors, not so much the CT screening. (C18)*
It (LCS) might help move them along the readiness to try and do something about quitting smoking. (C6)	*I don't think it (LCS) affects their motivation. The biggest (motivator) will be pressure from family members. The second will be some sort of life event that has frightened them…a family member that's developed lung cancer. (C17)*
Illustrative patient quotes	Illustrative patient quotes
It (LCS) made me think. I've been trying these past two and a half, three months. I'm very proud of myself. I've been trying my hardest to stop. (P8)	*Not for me, it (the screening test) didn't matter…I have no support. I have a lot of physical problems. (P3)*
Yeah, it (LCS) does. It make me know that I really need to leave 'em [cigarettes] alone. (P12)	*I have said my entire adult life whether you were a smoker or a nonsmoker, if you were genetically disposed to…cancer or anything else, you're going to get it and I'm not going to really worry about it. (P15)*
I'm 69, smoking is catching up on me…The worst thing I could think of would be the onset of cancer. (P19)	
Results disclosure: positive results	
Teachable moment	**Not a teachable moment**
Illustrative physician quotes	Illustrative physician quotes
I think if they have a nodule, they may be more receptive to the concept of quitting. (C8)	*Then again, they're really stressed at that time (of a positive test) so it's tough. (C21)*
I've had a few people start to be like, "Oh, I was worried it (nodule) was cancer. It could be then they're thinking a little more about quitting. (C3)	Illustrative patient quotes
Illustrative patient quotes	*Since they didn't really seem too upset or worried about [the nodule], I'm trying not to be….I mean it's in the back of my head I mean but I'm still smoking so it's way in the back of my head. (P15)*
Not a whole lot I can do but try to stop smoking to not make it progress even worse. (P5)	
I've been smoking since I was 10 years old…until the date I had my first scan from this screening. …The doctor told me 'We have some results on the scan, and we see something that's not good.' (P17)	
Results disclosure: negative results	
Teachable moment	**Not a teachable moment**
Illustrative physician quotes	Illustrative physician quotes
I have patients who didn't have any nodules, but had severe emphysema on their CT and now they've quit smoking. (C2)	*We were hoping that there's a little bit of scare effect so that patients quit, but when it (LCS) is negative, (it can) also have the opposite reaction. (C12)*
Illustrative patient quotes	Illustrative patient quotes
When I had my CT scan, I was a little nervous. My doctor called and said …	*She said everything looks fine …then I'm thinking to myself well, I been smoking this long and everything's fine so why should I quit smoking? (P14)*
My lungs were clear. I've been trying to stop smoking. I even cut down. …I feel good that I did take the test and know that I didn't have nothing, and no sign of no cancer. (P2)	

through screening scared them and they therefore increased their smoking: *"I do have some spots there. …I think I smoked a little bit more at the time…Nerves" (P2)*. Finally, some patients reported that a negative test result reduced their motivation to quit, providing them with justification for their continued smoking behavior: *"They said I was relatively clear, I was like, 'Oh, that's great'… It was like a free pass [to keep smoking]" (P9)*.

Integration of Smoking Cessation Counseling During LCS Discussions

Physician Perspectives

Most physicians stated that smoking cessation counseling and the initial LCS discussion occur separately (Table 3), reporting multiple barriers to integrating these two preventive health interventions into one conversation. That is, they were not likely to capitalize on the teachable moment that LCS may offer. While many physicians noted an opportunity to link smoking cessation and LCS discussions, this opportunity was often missed because of limited knowledge, resources, or time to deliver smoking cessation counseling. *"It's really time and knowing which modality to offer to which patient" (C2)*. Some physicians reported little motivation to counsel long-term smokers such as LCS-eligible patients because of prior frustrating experiences: *"Lack of success with it in the past, so you get a little bit nihilistic and say there's no point. This is something they've probably been contemplating in various parts of their life, so to think that I'm going to have some impact in less than three minutes is unrealistic" (C21)*.

Physicians did not typically use the opportunity of delivering LCS results to promote smoking cessation, again citing multiple barriers. Physicians noted that, in most cases, they delivered results through a letter or voicemail, leaving little opportunity to leverage a teachable moment: "*99 percent it's on the phone leaving a message. It's not a personal thing when you talk about the results" (C15)*. While some physicians believed that receiving suspicious results might increase a patient's motivation to quit, physicians expressed concerns that patients might be too overwhelmed by the possibility of cancer to engage in smoking cessation discussions: *"I think it's a big deal to have a positive result, so I might not [say], 'by the way, you better quit smoking'" (C19)*.

Nonetheless, a minority of physicians reported routinely integrating discussions on smoking cessation and LCS (Table 3): "*I wouldn't have a conversation about lung cancer screening without talking about smoking cessation" (C16)*. At the time of delivering positive screening results, some physicians discuss smoking cessation: *"For the people who there's nothing that's super concerning, but we need to do this extra scanning—those people I'll talk to about quitting smoking" (C2)*. Even negative LCS results can prompt physicians to engage in smoking cessation conversations: *"It's been that worry about them feeling they're in the clear. It's more at that point…that we get into the smoking cessation" (C7)*.

Patient Perspectives

Most patients acknowledged the value of quitting and expected their doctors to address their smoking. Thus, it was with some surprise that they echoed physicians' accounts that smoking cessation counseling and LCS with their physicians were not integrated. In the few cases in which patients reported that their physician linked discussion of positive LCS results and smoking cessation, they found this approach effective:

> "When I first had my CAT scan, they found out that I had some lung nodules. …He suggested I quit smoking. …That's why I quit, because they [said] 'The best thing for you to do is to quit smoking'" (P5).

By contrast, many patients perceived that the current approach, which typically fails to link smoking cessation counseling with delivery of low-risk results, is not effective.

> "I was actually scared coming into [the screening test]. Then that letter I got said, 'Well, we saw a few little things. Five percent of the time, they become a real problem. We'll keep our eye on you.' I had a ticket to smoke again. Good for another 20 years. Well, it was counterproductive. …I thought, 'Are they obligated to put it in these terms?' Because they really did let me off the hook. Why don't they keep me scared about that 5% chance?" (P9).

Physician Suggestions on How to Better Link Smoking Cessation Counseling With LCS

Physicians volunteered suggestions on how tobacco treatment could be better integrated with LCS discussions to overcome specific barriers (Table 4). To overcome barriers of limited time and knowledge gaps about tobacco treatment, physicians suggested embedding dedicated tobacco treatment personnel in clinic, allowing a warm handoff immediately following a LCS discussion:

> "It would be great if there was more of a smoking cessation presence that's physically located and related to the pulmonary clinic because then you could say please stop in the hallway—it gives a message of how strongly we feel about smoking cessation" (C19).

Physicians offered examples of how one might use LCS discussions to create a teachable moment for smoking cessation (Table 4).

> "I would take it as this captive opportunity to do two things which will improve their health. One is to talk about smoking cessation and the other is to talk about lung cancer screening and how the risk of lung cancer and the benefits of lung cancer screening is particularly the highest in people that are smoking now" (C16).

When discussing positive LCS findings, physicians suggested that building on the fear of lung cancer with messages such as *"after that scare, this is a good time to quit" (C5)* might facilitate smoking cessation. Lastly, physicians suggested how one might use negative LCS results to facilitate smoking cessation, mostly relying on indicators of health risk to drive counseling on smoking cessation: *"If you continue to smoke there's still chance of you developing cancer, and also cancer is not the only bad side of smoking" (C12)*.

Discussion

We explored physicians' and patients' perceptions regarding how LCS discussions may present opportunities to address smoking cessation. Main findings included: (1) Using the initial LCS encounter as a teachable moment was perceived as beneficial by some patients and physicians, but ineffective by others; (2) Differing perceptions of the utility of LCS to motivate smoking cessation leads to inconsistent smoking cessation counseling during LCS; (3) While many physicians believed LCS could be a teachable moment for smoking cessation, they doubted its ability to function as a teachable moment in the current state, identifying several barriers to integrating smoking

Table 3. Variable Integration of Smoking Cessation Counseling During Lung Cancer Screening (LCS) Discussions

LCS (SDM discussion)	
Smoking cessation and lung cancer screening discussions often occur separately Illustrative physician quotes *I think they (the smoking conversations) are not necessarily linked to the screening CT (C9)* *No I don't think of them (smoking cessation and lung cancer screening) together-that's like a separate thing you go through and then the screening is its own thing. (C1)* Illustrative patient quotes *She always told me I need to stop smoking.* She always said that. *She didn't really make no connection [to screening] or say nothing to me. (P12)*	Smoking cessation and screening discussions sometimes occur together Illustrative physician quotes *Definitely I wouldn't have a conversation about lung cancer screening without talking about smoking cessation. (C16)* Illustrative patient quotes *Well he basically told me I shouldn't be smoking and he was going to schedule me [for the screening CT] (P19)*
Results disclosure: positive results	
Smoking cessation discussions and delivery of positive LDCT results often occur separately. Illustrative physician quotes *It almost always really focuses on the CT findings themselves, not the smoking. (C18)* *I think the fours (Lung Rads 4), those people also need to quit smoking, but not in that moment. That moment is not the right time. You're not going to get anywhere with that conversation. (C2)*	Positive test results may sometimes promote smoking cessation discussions Illustrative physician quotes *If they found a nodule…it's a chance to talk about smoking cessation. (C14)* *I definitely took it to my advantage to bring it up. Not that smoking was going to make this nodule turn into something, but at least it was a way to (discuss smoking). (C7)* Illustrative patient quotes *He did connect it to the cigarette smoking. He kept telling me that I had a lot of white patches on my lungs and they don't know what cause of it. They suggest me to stop smoking. …I smoke less. (P13)*
Results disclosure: negative results	
Smoking cessation conversations seldom occur during delivery of negative test results. Illustrative physician quotes *I don't think I've ever connected the results to their current or former smoking status. (C11)* *Now if I'm calling them just to tell them the results of the CT scan, I might not necessarily get once again into the smoking cessation. (C20)*	Occasionally, a negative scan promotes smoking cessation discussions. Illustrative physician quotes *A bit more [smoking cessation counseling] at the time of the results…It's been that worry about them feeling they're in the clear. It's more at that point. (C7)* Illustrative Patient Quotes *They informed me all was clear….He says, "You need to quit." I've been trying. I'm doing well now. (P8)*

cessation counseling with LCS discussions. Physicians suggested concrete strategies to use both positive and negative screening results to motivate smoking cessation.

Previous studies in settings that might be considered teachable moments for smoking cessation, such as pregnancy, cancer diagnosis, or asthma exacerbation, have found that clinicians' experiences and views on smoking cessation services and perceived organizational constraints within these contexts influence smoking behavioral change.[11,25,26] Our study also suggests that varying institutional policies and available resources for smoking cessation treatment within LCS programs give rise to inconsistent smoking cessation counseling during LCS. Patients, however, reported that LCS made them more cognizant of their smoking behaviors and potential health consequences of smoking, and they "wished" their clinicians more strongly emphasized the need for them to quit smoking when discussing LCS. We also found that, consistent with the teachable moment, LCS prompts patients' awareness of the harms of smoking and evokes feelings of vulnerability, relief and worry. Even patients who were long-term, heavy smokers (LCS eligibility criteria require at least 30 pack-years of tobacco use) felt that LCS may finally provide their signal to quit. This dovetails with prior research, which showed that providing an explanation of the link between smoking and cervical cancer to healthy women increased perceptions of vulnerability to cervical cancer and intentions to stop smoking.[27]

Patients discussed how LCS results affected their motivation to quit regardless of whether they received normal or abnormal results. Sending test results by letter, although often the norm with low-risk results, represents a missed opportunity to leverage the teachable moment of screening to promote smoking cessation. Many patients preferred more direct communication on smoking cessation, particularly when screening results showed low risk of malignancy, viewing current messaging about low-risk results as ineffective or even counterproductive to motivating smoking cessation.

Patients in our study reported similar experiences across sites, with the exception that Veterans may perceive their smoking risk differently than others in light of other military exposures and may minimize the link between smoking and their lung cancer risk. Stronger messaging about the importance of smoking cessation and addressing these misperceptions may be necessary in VA settings, a conclusion similarly drawn in a VA study on health beliefs related to smoking and LCS,[12] although our evidence suggests that even in non-VA settings, patients want stronger emphasis on the importance of smoking cessation.

Studies suggest that smokers with a screen-detected nodule are more likely to quit smoking than those with normal results.[28–33] Our findings suggest that abnormal LCS results may serve as a "wake-up call," increasing patients' awareness of the harms of smoking, their fear of cancer, and the belief that smoking is no longer acceptable. Thus, an LCS-detected nodule is an opportunity to initiate conversation to

Table 4. Barriers and Proposed Communication Strategies to Facilitate Smoking Cessation Counseling During Lung Cancer Screening (LCS) Discussions

Physician barriers to leveraging LCS as a teachable moment	Physician suggestions for initiating conversations to co-create a teachable moment
LCS (SDM discussion)	
Many physicians perceive that limited time and resources are barriers to discussing tobacco dependence *A barrier is the time that it would take, and the fact that you have the office visit, and you're really typically managing some medical condition. It can take a while to get into it in terms of assessing their readiness to quit and assessing what's going be the most effective strategy for them. (C21)*	Suggestions: Offer on the spot cessation counseling *I think in a perfect world having some person-a physician extender of some sort-who could do some on the spot counseling. (C1)* *If we had someone who could right there and then on any visit in that clinic session provide some education and some written materials and have done that one counseling session with an open door to participating in more if they wanted to, that's the sort of thing that could be really good. (C20)*
Some physicians perceive that patients have little motivation to quit and that LCS has minimal impact to increase it. *I'm not sure it (LCS) makes a huge difference for the patients. I don't mean to be a broken record, but I think that there are other bigger issues, at least for most of our patients that regulate their smoking. Yeah, it reminds us to bring it up, but from their perspective, it's probably just the third or fourth time we've brought it up. (C18)*	Suggestions: How to use the LCS process to motivate smoking cessation. *If they're a current smoker, I need to talk to them a little bit about how the most important thing for preventing lung cancer is to stop smoking. That it's part of the whole screening process and more important than having the (test) is actually being involved in a smoking cessation program. (C19)*
Some physicians perceive that smoking-related symptoms rather than future health risk motivates smoking cessation. *It's really easy to pick on symptoms and link that to smoking cessation more easily than the theoretical risk of lung cancer.... (C4)*	Suggestions: How to use the LCS process to increase patient perception of lung cancer risk. *I'm saying, 'well you shouldn't be smoking. We're getting this test cause you're smoking,' and you're using that a little bit for some motivation. ... Maybe (we) need some better scripting around the smoking to tie it into a little bit. (C7)*
Results disclosure: positive results	
Some physicians worry that patients are too stressed to engage in smoking cessation discussions when delivering positive results. *I don't feel like when they're in the middle of a kind of work-up, it is easy for them to also focus on the smoking cessation. (C10)*	Suggestions: How to use positive screening results to promote smoking cessation. *I probably would say, look, I'm going send you to the experts that follow these nodules and let's go back to talking about smoking cessation, all the more reason for you to stop. (C16)*
Results disclosure: negative results	
Some physicians perceive that using a negative test result to promote smoking cessation is counterintuitive. *If it's totally, totally normal, it's really hard to use it that way. 'There's nothing wrong with your lungs. Do you want to quit smoking?' That's just a weird conversation. (C2)*	Suggestions: How to use negative screening results to discuss smoking cessation. *If it's a normal CT scan, I'm going say that's good news. We'd like to see the same thing. We'd like to not have to worry about it. Here's a good opportunity to quit. (C5)* *Although this (CT) is negative, there are a lot of other reasons to stop smoking, and talk about emphysema and potential oxygen-dependence. (C10)*
Many physicians have minimal contact with patients when delivering negative results. *Often times, I'm not seeing them after the screen's been completed. (C21)*	Suggestions: How to connect negative screening results to smoking cessation messaging. *I generally just write them a letter if it's normal: Your CT scan of your lungs was fine. We were screening for lung cancer. There's no evidence. We should readdress redoing this in a year to continue the screening process. If they still are smoking, I put in a little plug for quitting. (C2)*

reinforce the desire to quit smoking. Yet our results suggest physicians often missed this opportunity to deliver tobacco treatment in conjunction with informing patients about a screen-detected nodule. While some physicians expressed concern about overwhelming patients by discussing smoking cessation during delivery of abnormal results, some patients would have welcomed a "scarier" delivery of results, which they believed would help motivate them to quit smoking. Parallel findings have been observed in other clinical contexts: Studies in mental health settings have found smokers with psychiatric disease and co-occurring substance use disorders to be amenable to receiving tobacco dependence treatment even when their healthcare provider assumes they are not.[34] In addition, a qualitative study of patients and clinicians in the cancer diagnosis context showed that healthcare professionals avoided talking about smoking because of concerns of exacerbating patients' guilt of smoking.[25] Similar to our study, the authors reported that although patients expected some mention of smoking cessation, many clinicians felt such discussions were inappropriate and/or unlikely to be effective. Thus, despite improved survival in cancer patients who quit cigarettes,[35–42] many opportunities to promote smoking cessation were missed.[25]

Patient–physician interactions are central to the co-creation of teachable moments for health behavior change.[43] While some events such as receiving abnormal LCS results may serve as triggers for smoking cessation,[28–33] others, such as low-risk findings, may require reinforcement from physicians to become salient triggers for smoking cessation.[12] Participants proposed several communication strategies to leverage negative screening results into a teachable moment for smoking cessation. These suggestions could guide future interventions to promote smoking cessation counseling in the LCS context, an area identified as in need of further research.[8,44–46]

Our study has limitations. Patients' and physicians' recollections of clinical encounters where smoking cessation could be a topic were likely complicated by the passage of time and the negative value of smoking shared by most. Patients who agreed to participate may have been more concerned about the harms of smoking and lung cancer risk than those who declined. Physicians may have overrepresented their smoking cessation counseling, particularly given their relationship as professional colleagues of the interviewers. Yet, most physician participants were frank in acknowledging that they are not consistently integrating smoking cessation interventions with LCS discussions. Conversely, our clinical interests in smoking cessation may have subtly influenced data collection and interpretive data analysis; they certainly motivated the study. These considerations called for our reflexive, internal critique of the study at every step, fostered in part by the inclusion of non-clinicians in the study team. Although qualitative methods enable deep appreciation of participants' experiences, low participation rates, convenience sampling, and smaller sample size limits generalizability. To increase generalizability, we enrolled participants from four diverse sites, although the findings may not represent experiences of all patients undergoing LCS and women were underrepresented in the three VA study sites.

In summary, we found that LCS highlights the harms of smoking to heavily addicted smokers, prompts patients to reflect on their smoking habits, and increases their resolve to avoid the undesired effects of smoking, demonstrating the constructs of the teachable moment. By contrast, physicians and patients reported little connection and insufficient integration between LCS and smoking cessation discussions, findings that have been described in other cancer settings.[47] Our results help identify system and physician barriers to guideline adherence of recommendations to integrate smoking cessation counseling with initial conversations about LCS. Understanding strategies to overcome these barriers, including how to effectively utilize patient visits in the context of LCS to implement smoking cessation interventions, is critical. In particular, ensuring healthcare practitioners receive training to achieve competency in tobacco dependence treatment and realize the opportunity and "duty of care" in addressing smoking cessation in the teachable moment of LCS, is needed to maximize health outcomes for these patients at high risk of developing lung cancer. In addition, this study highlights that post-screening messaging related to motivating smoking cessation, tailored to LCS results, may be critical in helping patients quit. To maximize the potential to reduce smoking-related morbidity and mortality, physicians should take advantage of LCS as an opportunity to deliver effective messages that build on patients' perceptions of personal vulnerability, emotions, and changes in self-concept to motivate smoking cessation.

Supplementary Material

Supplementary data are available at *Nicotine and Tobacco Research* online.

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Declaration of Interests

HK has consulted for Remedy Partners on relevance of codes for pulmonary services. The authors have no other conflicts of interests to disclose.

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