Patient–Provider Discussion About Lung Cancer Screening Is Related to Smoking Quit Attempts in Smokers

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OBJECTIVES: To investigate the relationship between patient–provider discussions about lung cancer screening and smoking quit attempts among adults eligible for lung cancer screening.

PARTICIPANTS & SETTING: Secondary analysis of data collected online from 283 current smokers, ages 55–74 years, with no history of lung cancer and with at least a 20 pack-year smoking history.

METHODS & VARIABLES: Descriptive statistics and multivariable logistic regression analyses were conducted. The outcome variable was smoking quit attempt, and the key independent variable was patient–provider discussion about lung cancer screening.

RESULTS: More than a third of participants (39%) tried to quit smoking in the past year, and the majority (58%) did not use any smoking cessation methods. Logistic regression analyses demonstrated that patient–provider discussion about lung cancer screening was significantly associated with smoking quit attempts.

IMPLICATIONS FOR NURSING: Nurses could increase patients' awareness about benefits of lung cancer screening and advocate for evidence-based smoking cessation programs.

KEYWORDS lung cancer screening; patient–provider discussion; smoking quit attempt; smoking cessation

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Lung cancer is the second most commonly diagnosed cancer in the United States and is the leading cause of cancer-related death in men and women (Siegel et al., 2020). In 2022 in the United States, a total of 236,740 new lung cancer cases were projected to be diagnosed, with 130,180 deaths (Siegel et al., 2022). Lung cancer has a poor prognosis, with a five-year survival rate of 18.6% after diagnosis (Noone et al., 2018). Late detection of the disease causes the poor survival rate. Detecting lung cancer with low-dose computed tomography (LDCT) at earlier and more treatable, localized stages can significantly decrease the mortality rate of lung cancer (National Lung Screening Trial Research Team [NLSTRT] et al., 2011). When lung cancer is diagnosed at earlier stages, more curative treatment options are available and the five-year survival rate is 56%; however, only 16% of all lung cancer cases are diagnosed in early stages (Noone et al., 2018).

Cigarette smoking is the main risk factor for developing lung cancer (U.S. Department of Health and Human Services, 2014). Despite the harmful health effects of cigarette smoking, about 34 million Americans ages 18 years and older still smoke cigarettes (Centers for Disease Control and Prevention [CDC], 2020). Cigarette smoking is responsible for more than 480,000 deaths every year in the United States and accounts for 90% of all lung cancer cases (CDC, 2020), even though effective tobacco-dependence treatments are available for smokers. The U.S. Department of Health and Human Services' (2014) clinical practice guideline identifies the combined use of pharmacotherapy and behavioral interventions as the best treatment program for smoking cessation (Fiore et al., 2008). However, uptake among smokers has been low. Given the proven and strong

causal relationship between cigarette smoking and the development of lung cancer (U.S. Department of Health and Human Services, 2014), the U.S. Preventive Services Task Force recommends annual lung cancer screening with LDCT for high-risk individuals (Printz, 2020). High-risk individuals eligible for lung cancer screening are aged 50 years, have a history of at least 20 pack-years of cigarette smoking, and currently smoke or quit smoking within the past 15 years (Printz, 2020). A smoking pack-year measures the lifetime exposure to cigarette toxins determined by the amount of cigarettes an individual has smoked over a long period of time (National Cancer Institute, 2018). About 8 million Americans meet the criteria for lung cancer screening (Landy et al., 2019).

The National Lung Screening Trial, an eight-year randomized controlled trial (NLSTRT et al., 2011), showed a 20% reduction in lung cancer mortality in adults ages 55-74 years at increased risk for developing lung cancer who underwent screening with LDCT, compared to those who were screened with chest x-rays. The high-risk adults had a history of at least 30 pack-years of cigarette smoking and were current or former smokers who quit within the past 15 years (NLSTRT et al., 2011). Since 2015, the Centers for Medicare and Medicaid Services has provided coverage for lung cancer screening counseling, shared decision-making, and annual lung cancer screening with LDCT for appropriate beneficiaries using 30 pack-years criteria. The Affordable Care Act has also mandated private insurers to cover lung cancer screening with LDCT as a standard for preventive care for eligible patients (Centers for Medicare and Medicaid Services, 2015). During the counseling and shared decision-making visit, healthcare providers should discuss the benefits and risks of lung cancer screening, and the importance of cigarette smoking cessation interventions with current smokers or maintaining cigarette smoking abstinence among former smokers (Centers for Medicare and Medicaid Services, 2015).

The current study used the Conceptual Model for Lung Cancer Screening Participation developed by Carter-Harris et al. (2016). This conceptual model shows that demographic characteristics, healthcare provider recommendations, and psychological, cognitive, social, and environmental variables, play an important role in explaining lung cancer screening behavior among those eligible for lung cancer screening (Carter-Harris et al., 2016). Patient–provider communication and shared decision-making contribute to cancer screening adherence and smoking cessation (Golden et al., 2020; Goodwin & Li, 2020; Simmons et al., 2009). Studies have shown that lung cancer screening presents a teachable moment to motivate cigarette smoking cessation (Brain et al., 2017; Land & Marcus, 2015; Lococo et al., 2017; Poghosyan et al., 2012). Specifically, Brain et al. (2017) reported that high-risk adults who receive lung cancer screening are significantly more likely to quit smoking. Thus, lung cancer screening provides an opportunity to engage current smokers in tobacco-dependence treatment. Although the positive impact lung cancer screening has on smoking behavior is clear, little is known about the potential impact of patient–provider discussions about lung cancer screening on patients' smoking behavior. In addition, data are limited regarding whether patients attempt to quit smoking after discussions with their healthcare providers. Evidence is needed on how providers can change patients' smoking behavior through discussions about lung cancer screening. Such evidence can increase awareness about screening and the importance of smoking cessation. The purpose of this study was to investigate the relationship between patient–provider discussions about lung cancer screening and smoking quit attempts among adults ages 55–74 years, who are potentially eligible for lung cancer screening. In addition, the study evaluated participants' smoking cessation methods.

Methods

Design and Setting

This study is a secondary analysis of an online survey's data produced from the "Electronic and Tobacco Cigarettes Use Among Individuals at High Risk for Lung Cancer" study focused on lung cancer screening and smoking behaviors (Poghosyan et al., 2022). The parent cross-sectional study surveyed adults, ages 55–74 years, who were at increased risk for developing lung cancer. Eligible adults had no history of lung cancer, reported smoking at least 100 cigarettes in their lifetime, and, at the time of the survey, were former smokers or actively smoked every day or some days.

The parent study used Qualtrics Panel Services (2014), an online survey platform, to recruit study participants. Qualtrics Panel Services is widely used to conduct research studies (Beymer et al., 2017; Cataldo, 2016).

Sample and Data Collection

In the parent study, 821 adults, ages 55–74 years, who were current or former smokers and at high risk for developing lung cancer participated and completed

TABLE 1. Sample Characteristics (N = 283)

Characteristic	n	%
Age (years)		
55–64	225	80
65–74	58	20
Gender		
Female	176	62
Male	107	38
Race		
Asian	50	18
Black	73	26
White	104	37
Other	56	20
Ethnicity		
Hispanic	73	26
Non-Hispanic	188	66
Unknown	22	8
Education		
High school or less	75	27
Some college	124	44
College or postgraduate degree	84	30
General health status		
Poor	14	5
Fair	97	34
Good	114	40
Very good or excellent	58	21
Health insurance		
Private or Veterans Affairs	101	36
Medicare	71	25
State or other	85	30
Uninsured	26	9
Marital status		
Unmarried	176	62
Married	107	38
Annual income ($)		
24,999 or less	103	36
25,000–49,999	92	33
50,000 or more	88	31
Cancer history (other than lung cancer)		
No	257	91
Yes	26	9
Lung cancer screening discussion		
No	238	84
Yes	45	16

Note. Because of rounding, percentages may not total 100.

the online survey. The data were collected in 2017 in the United States. The survey completion rate was 18.8%, which is consistent with other online surveys (Cataldo, 2016). Study participants were reimbursed by Qualtrics for completing the survey. Researchers do not have information about how many study participants get reimbursed by Qualtrics, which has contracts with their population panel and pays participants directly.

For the current study, only the data from current smokers with at least a 20 pack-year smoking history were extracted, which totaled 283 adults, ages 55–74 years, from 49 different states. Northeastern University's institutional review board approved this study.

Measures and Variables

Participants of the parent study completed an online questionnaire, which collected demographic, socioeconomic, and psychological details, health risk behavior factors, chronic health conditions, general health status, lung cancer screening behaviors, and self-efficacy and risk perceptions. The questionnaire items were selected from valid and reliable surveys related to the parent research topic (CDC, 2015, 2016; National Cancer Institute, 2017).

Smoking quit attempt: The outcome variable of the current study was a self-reported smoking quit attempt. Participants were asked, "During the past 12 months, have you stopped smoking tobacco cigarettes for 24 hours or more because you were trying to quit?" Those who reported "yes" were classified as making a quit attempt, and those who reported "no" were classified as not making a quit attempt during the past year (CDC, 2015).

Patient–provider discussion: The key independent variable was the presence of a self-reported discussion between healthcare providers and patients about lung cancer screening during the past year. Participants were asked, "At any time in the past year, have you talked with your doctor or other health professional about having a test to check for lung cancer?" Those who reported "yes" were classified as having discussed lung cancer screening with their healthcare provider, and those who reported "no" were classified as not having discussed lung cancer screening with their healthcare provider in the past year (National Cancer Institute, 2017).

Smoking history and quit attempt methods: Smoking history variables included pack-years of cigarette smoking, years smoked, and the age when participants began smoking. Smoking pack-years

were calculated by multiplying the number of packs of cigarettes smoked per day by the number of years the person has smoked (National Cancer Institute, 2018).

To assess participants' methods to try to quit smoking, the following question was asked: "During the past 12 months, did you use any of the following to try to stop smoking tobacco cigarettes?" Response options were counseling; nicotine replacement therapy, such as a nicotine patch, gum, or lozenges; other prescription medications, like a nasal spray, nicotine inhaler, or pills such as bupropion, varenicline, or other nicotine-receptor blockers; a "quit line" or telephone smoking support line; switching to electronic cigarettes (i.e., e-cigarettes or personal vaporizers); switching to other smokeless tobacco, such as snuff or chewing; and none of the listed methods.

Covariates: Self-reported covariates were demographic characteristics and included age (55–64 years versus 65–74 years), sex (male versus female), race (White, Black, Asian, and other [included multiple races and unknown race], and marital status (married versus not married). Socioeconomic factors included annual household income ($24,999 or less, $25,000–$49,900, and $50,000 or more), education (high school or less, some college, or college degree or postgraduate degree), and health insurance (Medicare, private, or Veterans Affairs plan, state or other, or uninsured). General health status was measured by asking participants the following question: "Would you say that in general your health is—?" with a Likert-type scale ranging from 1 (poor) to 4 (very good or excellent). History of a cancer diagnosis other than lung cancer was coded as "yes" or "no" (CDC, 2016).

Data Analysis

All statistical analyses were conducted using statistical software package Stata 16.1 (StataCorp). The data were first evaluated for normality and outliers, and descriptive statistics were then conducted to describe sample characteristics. Frequencies and percentages were calculated for categorical variables and means, standard deviations, and ranges for continuous variables. Frequencies and percentages were also computed to assess smoking cessation methods used by study participants. Bivariate associations between key variables were conducted. The association between patient–provider discussion about lung cancer and smoking quit attempts was investigated with a multivariable logistic regression model, which generated adjusted odds ratios and 95% confidence intervals (Pompeo et al., 2003), and controlled for all covariates. Analyses were two-tailed, and a p value less than 0.05 indicated statistical significance.

Results

Sample Characteristics

Table 1 describes characteristics of the study's participants. Of the 283 participants, most were ages 55–64 years, female, and non-Hispanic. The majority of the sample reported not having discussions with their healthcare providers about lung cancer screening during the past year.

Smoking History and Quit Attempts

More than half of the participants had a history of 30 or more pack-years of cigarette smoking, and the mean years of smoking was 44.4. More than a third of the study's participants tried to quit smoking in the past 12 months (see Table 2).

TABLE 2. Participants' Smoking History and Quit Attempts (N = 283)

Variable	$\bar{X}$	SD	Median	Range
Pack-years cigarette smoking	39.4	20.5	33	20–135
Years smoked	44.4	5.4	44	26–61
Age first started smoking (years)	16.7	3.7	16	9–31
Variable			**n**	**%**
Pack-years cigarette smoking				
20–29.9			116	41
30 or more			167	59
Smoking quit attempt				
No			172	61
Yes			111	39

TABLE 3. Smoking Cessation Methods Used by Participants (N = 120)

Quit Method	n	%
Counseling	12	4
Nicotine replacement therapy	67	24
Other prescription medications	29	10
Telephone quit line	15	5
Switching to electronic cigarettes	81	29
Switching to other smokeless tobacco (snuff, chewing)	10	4

Note. Categories are not mutually exclusive.

Most of the participants reported not using any method to help them to quit smoking. Of the 120 (42%) who did, the most common method used to help them quit smoking was switching to electronic cigarettes, followed by nicotine replacement therapy (see Table 3).

Relationship Between Patient–Provider Discussion and Smoking Quit Attempts

Table 4 presents the results from the multivariable logistic regression model, estimating the association between patient–provider discussions about lung cancer screening and smoking quit attempts. Results indicate that participants who reported having discussions about lung cancer screening with their healthcare provider had higher odds of reporting quit attempts in the past year, compared to those who reported not discussing lung cancer screening with their provider (odds ratio = 2.2, 95% confidence interval [1.1, 4.5], p = 0.028). No other covariates were found to be statistically significantly associated with smoking quit attempts among study participants.

Discussion

This study investigated the relationship between patient–provider discussions about lung cancer screening and smoking quit attempts among adults ages 55–74 years who were potentially eligible for lung cancer screening. The results show that 39% of high-risk adults tried to quit cigarette smoking in the past year. Other studies reported similar (40%) (Borland et al., 2012) or higher (from 56% to 60%) smoking quit attempt rates (Valvi et al., 2019; Walton et al., 2019). The findings of this study also showed that the discussion between patients and healthcare providers about lung cancer screening was significantly associated with smoking quit attempts. In fact, participants who had those discussions with their healthcare provider had 120% increased odds of making smoking quit attempts in the past year. This finding indicates the critical importance of patient–provider discussions, even though Huo et al. (2019) reported no significant association between the two. The contradictory findings might be related to different populations studied and methods used. The current study's sample included only high-risk adults based on age and cigarette smoking pack-years criteria, while Huo et al. (2019) included adults aged 18 years or older whose smoking history was based on current, former, and never smoking status, regardless of pack-years smoking history. Participation in lung cancer screening may motivate smokers to quit smoking; some studies reported 20%–35% of smokers who participated in screening were considering quitting smoking in the next 30 days, and 43%–51% of smokers were considering quitting smoking within the next six months (Poghosyan et al., 2012; Schnoll et al., 2002; Taylor et al., 2007). Because of the limited number of studies on the impact of patient–provider discussions about lung cancer screening on patients' smoking behavior, more research is needed to confirm the association between the two.

Despite the strong relationship between patient–provider discussions and smoking quit attempts found in this study, the results showed that the rate of patient–provider discussions about lung cancer screening was low. Most of the sample (84%) who were at increased risk for developing lung cancer, and were potentially eligible for lung cancer screening based on current age and smoking criteria, did not have a discussion with their healthcare providers about lung cancer screening during the past year. Therefore, only 16% of high-risk adults had a prior discussion about lung cancer screening with their healthcare provider. Similar low rates of patient–physician discussion regarding lung cancer screening have been reported (Chalian et al., 2019; Goodwin et al., 2019; Huo et al., 2019). Chalian et al. (2019) found that only 12% of adults eligible for lung cancer screening had discussed lung cancer screening with their healthcare provider. One explanation for such low rates may be the lack of providers' knowledge and awareness of lung cancer screening, specifically regarding the eligibility criteria for screening. One study reported that only 31% of healthcare providers know

TABLE 4. Multivariable Logistics Regression Analysis Predicting Smoking Quit Attempt (N = 283)

Characteristic	AOR	95% CI	p
Lung cancer screening discussion			
No	1	–	–
Yes	2.2	[1.1, 4.47]	0.028
Age (years)			
55–64	1	–	–
65–74	1.08	[0.5, 2.31]	0.832
Gender			
Female	1	–	–
Male	0.7	[0.57, 4.1]	0.194
Race			
White	1	–	–
Black	0.92	[0.46, 1.82]	0.806
Asian	0.7	[0.3, 1.58]	0.384
Other	0.76	[0.36, 1.57]	0.457
Ethnicity			
Non-Hispanic	1	–	–
Hispanic	0.76	[0.38, 1.54]	0.453
Unknown	1.52	[0.57, 4.06]	0.4
Marital status			
Unmarried	1	–	–
Married	1.34	[0.75, 2.38]	0.313
Education			
High school or less	1	–	–
Some college	1.46	[0.76, 2.8]	0.252
College or postgraduate degree	1.58	[0.74, 3.34]	0.231
Income ($)			
24,999 or less	1	–	–
25,000–49,999	0.8	[0.42, 1.5]	0.494
50,000 or more	0.66	[0.31, 1.44]	0.307
Pack-years cigarette smoking			
20–29.99	1	–	–
30 or more	0.84	[0.5, 1.41]	0.505
Health insurance			
Private or Veterans Affairs	1	–	–
Medicare	0.61	[0.28, 1.33]	0.217
State or other	1.05	[0.51, 2.14]	0.891
Uninsured	0.76	[0.51, 2.1]	0.59
General health status			
Poor	1	–	–
Fair	0.43	[0.13, 1.48]	0.184
Good	0.54	[1.56, 1.8]	0.315
Very good or excellent	0.4	[0.11, 1.43]	0.158

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TABLE 4. Multivariable Logistics Regression Analysis Predicting Smoking Quit Attempt (N = 283) *(Continued)*

Characteristic	AOR	95% CI	p
Cancer history (other than lung cancer)			
No	1	–	–
Yes	0.82	[0.33, 1.2]	0.661

AOR—adjusted odds ratio; CI—confidence interval

accurate lung cancer screening eligibility criteria (Duong et al., 2017), suggesting that patient–provider discussions about lung cancer screening are substantially underused, even though the Centers for Medicare and Medicaid Services provides coverage for counseling and shared decision making. Lack of patient–provider discussion about lung cancer screening may prevent many high-risk individuals from accessing available smoking cessation programs. According to Kathuria et al. (2020), patients prefer that their healthcare providers strongly emphasize the importance of quitting smoking during discussions about lung cancer screening.

In the present study, 58% of the participants did not use any smoking cessation methods to help them quit, even though effective tobacco dependence treatments exist. This finding is consistent with those of Pierce et al. (2020), which reported that 57% of participants did not use any method to help them quit smoking. The U.S. Public Health Service lists pharmacotherapy and behavioral interventions, when used together, as the most effective smoking cessation method (Fiore et al., 2008). Clinician counseling alone improves the smoking quit rate by 19%. However, clinician counseling combined with nicotine replacement therapies was 3.6 times more effective for quitting and achieved a 37% quit rate (Fiore et al., 2008). Even though combined multiple approaches are very effective and can triple smoking cessation rates, only 4% and 24% of the participants in this study used counseling and nicotine replacement therapy, respectively, to help them quit smoking. In addition, 29% of smokers switched to electronic cigarettes to help quit smoking. Although electronic cigarettes are smokers' preferred method of smoking cessation, electronic cigarettes are not an effective strategy for successful smoking cessation because they may contribute to further nicotine dependence (Chen et al., 2020; Pierce et al., 2020). Quitting smoking is the most effective approach to protect high-risk adults from the complications of smoking, improve their quality of life, extend their survival, and ensure they achieve the best outcomes. The findings of this study indicate the need to increase the use of available effective tobacco dependence treatments among high-risk individuals.

Limitations

The current study has a few limitations. The cross-sectional online survey design limits the ability to investigate causal relationships. Thus, future prospective longitudinal studies are necessary to understand the direct impact of patient–provider discussions on smoking behavior. The collected information did not identify whether providers were nurses, primary care providers, or other healthcare providers. The study's measures were self-reported, and the findings may be subject to response bias. The small sample size might limit the ability to identify other factors associated with smoking quit attempts.

The generalizability of the study findings is limited. The sample only included current smokers. No detailed information was collected from the former smokers to calculate pack-year smoking history. Future studies are needed with larger sample sizes to include current and former smokers who are eligible for lung cancer screening based on age and smoking pack-year history criteria.

The main independent variable was measured with one item, which is a limitation. In addition, no information was collected to understand who started the discussion about smoking cessation, the patient or healthcare provider, or if smoking cessation interventions were also discussed with communication about screening for lung cancer. Future studies need to use more specific and multi-item measures to test the relationship between patient–provider discussions and smoking quit attempts. Information for other substance use was not collected; therefore, the study was not able to control for other substance use that may be associated with smoking behavior. Despite these limitations, the current study provides

strong evidence of a positive relationship between patient–provider discussion about lung cancer screening and smokers' quit attempts.

Implications for Practice

The study's findings have critical implications for clinical practice. Nurses can play a vital role in increasing patients' awareness about the benefits of lung cancer screening. Nurses can also advocate for evidence-based smoking cessation programs that could help high-risk individuals quit smoking or maintain abstinence from smoking. These discussions can provide an opportunity for nurses to deliver smoking cessation counseling or refer current smokers to smoking cessation programs. During these discussions, nurses can emphasize the importance of maintaining cigarette smoking abstinence in former smokers. Adults eligible for lung cancer screening are not only at an increased risk for developing lung cancer, but also at an increased risk for other smoking-related diseases; these patients can benefit from smoking cessation interventions.

Conclusion

Lung cancer screening counseling, shared decision-making, and annual lung cancer screening with LDCT are evidence-based, recommended preventive services that can significantly reduce mortality from lung cancer. This study showed that patient–provider discussions about lung cancer screening are underutilized, yet increase the likelihood of smokers making quit attempts. Making smoking quit attempts is an important first step to increasing smoking cessation rates. A low rate of patient–provider discussions blocks many high-risk individuals from the benefits of smoking cessation programs. This study's findings underscore the critical need to promote patient–provider discussions about lung cancer screening. Effectively integrating a smoking cessation program into the lung cancer screening practice is needed. Efforts should be focused on promoting patient–provider discussions about lung cancer screening and effectively implementing the use of tobacco dependence treatments.

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- Patient–provider discussion about lung cancer screening is underutilized, yet it has a tremendous impact on motivating patients to make smoking quit attempts.
- Patient–provider discussion about lung cancer screening was significantly associated with making smoking quit attempts among adults at high risk for developing lung cancer.
- Efforts should be focused on promoting patient–provider discussions about lung cancer screening and effectively implementing the use of tobacco dependence treatments.

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