

# Using Social Media as a Platform for Increasing Knowledge of Lung Cancer Screening in High-Risk Patients

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Authors' disclosures of conflicts of interest are found at the end of this article.

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## Abstract

**Background:** Uptake in lung cancer screening for high-risk patients remains low. Eligible patients may not know that this preventive service is available and covered by insurance. **Objectives:** The objective of this study was to explore using social media to educate patients about lung cancer screening and assess motivation to discuss lung cancer screening with health-care providers after viewing the educational program. **Methods:** Subjects ages 55 to 77 who were current smokers or former smokers who quit in the past 15 years with a more than 30-pack-year smoking history were recruited via a Facebook advertisement. Subjects completed a demographic survey and the Lung Cancer Screening-12 (LCS-12) knowledge measure tool, watched a YouTube video about lung cancer screening, and completed the LCS-12 tool (post-test). Subjects rated their level of motivation to discuss lung cancer screening with their health-care provider. **Results:** This study used a pre-experimental, one-group pre-test and post-test design. Scores from the pre- and post-test were analyzed using the paired t-test. Descriptive statistics were used to analyze subject self-reporting of motivation to discuss screening with their provider. The mean knowledge score of participants ( $n = 31$ ) significantly increased from 5.26 to 8.19 after viewing the video ( $t = -5.956, p < .001$ ). The mean motivational level (1-5) was 3.52, with a mode of 5. **Conclusions:** A lack of knowledge regarding lung cancer screening may negatively impact the health of high-risk patients. This study suggests that social media can be used to increase knowledge of lung cancer screening. These findings demonstrate that the use of social media has a role in improving access to health information.

According to the American Cancer Society (2020), lung cancer is the leading cause of adult cancer-related deaths in the United States, with approximately 228,820 new cases and 135,720 deaths predicted in 2020. The National Lung Screening Trial reported that annual low-dose CT of the chest (LDCT) performed

in patients at high risk for lung cancer decreased mortality from lung cancer by 20% (Aberle et al., 2013). The U.S. Preventive Services Task Force gave lung cancer screening with LDCT a Grade B recommendation in 2013 (USPSTF, 2013). Based on this recommendation, the Centers for Medicare & Medicaid Services (CMS) and most commercial insurance providers now cover lung cancer screening with LDCT as a preventive health benefit. However, there has not been a significant increase in the rates of lung cancer screening with LDCT. In fact, between 2010 and 2015, there was only a 0.6% increase in the use of LDCT for lung cancer screening (Jemal & Fedewa, 2017).

Many eligible patients may not know that this preventive service is available and covered by insurance. Harnessing social media as a platform for education may increase awareness of screening. This will result in lung cancer being diagnosed at earlier stages, when it is most treatable, and ultimately may decrease the mortality of lung cancer.

## BACKGROUND

Despite insurance coverage, there has been lower-than-expected use of this screening modality. Cardarelli and colleagues (2017) note that eligible patients are not aware of the recommendation for lung cancer screening and do not know what screening entails. According to Retrouvey, Patel, and Shaves (2016), 86.9% of eligible patients surveyed were not aware of the recommendation for lung cancer screening. This lack of knowledge may be due to lack of patient-provider discussions about lung cancer screening (Carter-Harris, Tan, Salloum, & Young-Wolff, 2016a). Carter-Harris and colleagues (2016a) found that less than 20% of screening-eligible patients had discussions with their health-care providers about lung cancer screening in comparison to 50% to 80% having had discussions about breast and colorectal cancer screening. Patients who are informed about cancer screening may be more likely to participate in these screening modalities.

Social media platforms such as YouTube and Facebook are popular outlets for the dissemination of information of all kinds. According to Prochaska, Coughlin, and Lyons (2017), an estimated 89% of adults in the US are online, and 72% own smartphones. Social media outlets have the poten-

tial to reach a wide audience with a variety of socioeconomic and cultural backgrounds, while providing low-cost, highly scalable functionality with the use of video for health literacy (Prochaska et al., 2017). Koskan and colleagues (2014) suggested that popular social media sites such as Facebook should be appraised to determine their roles in promoting cancer screening.

Using social media to recruit study patients has been described more frequently over the past few years (Carter-Harris, Bartlett Ellis, Warrick, Rawl, 2016b; Thompson, 2014). Carter-Harris and colleagues (2016b) found that using Facebook is considerably more cost effective than traditional recruiting methods such as newspaper advertisements. The authors posit that due to the stigma associated with smoking, current and former smokers may prefer the privacy and flexibility of social media (Carter-Harris et al., 2016b). Xu and colleagues (2016) discuss that knowledge and awareness of cancer vary widely among the US population and promoting knowledge about cancer should be focused among those with the highest cancer burden. Xu and colleagues (2016) explored the use of social media outlets to disseminate information about cancers and found that social media can be a powerful tool to circulate information to the community and may be able to reduce ethnic and racial disparities.

Health knowledge is a key component of health and allows patients to make informed choices (Kesanen, Leino-Kilpi, Arifulla, Siekkinen, & Valkeapaa, 2014). A systematic review of knowledge tools used in patient education found that most tests were health-problem related, with a mean of 20 true/false/multiple-choice questions specifically designed for the studies in the review (Kesanen et al., 2014).

There are several studies describing the use of educational sessions to improve patient knowledge of lung cancer screening. Rosenkrantz, Mason, Kunzler, and Lee (2016) describe educational sessions about image-based cancer screening and found that roughly 90% of respondents noted an increase in knowledge regarding screening. Mazzone and colleagues (2017) assessed changes in patient knowledge before and after viewing a 6-minute video about lung cancer screening and found that there was an increase in patient knowl-

edge both immediately after viewing the video and 1 month following.

Another factor that may have an impact on the low uptake of lung cancer screening is motivation. Schapira and colleagues (2016) found that uncertainty felt by patients can impact their willingness to undergo lung cancer screening and that by decreasing uncertainty in patients, they may be motivated to undergo screening. One way to alleviate this uncertainty may be to increase patient knowledge.

Ali and colleagues (2015) sought to identify barriers to participation among patients at high risk for lung cancer. The authors found that women, current smokers, older patients, and those from lower socioeconomic groups were less willing to participate in lung cancer screening. Based on this information, strategies to customize educational programs for these subgroups may result in higher levels of motivation for screening.

Jonnalagadda and colleagues (2012) evaluated cognitive and affective beliefs about lung cancer among patients at high risk for lung cancer in relation to their intention to have screening and found that fatalistic beliefs, fear of radiation exposure, and anxiety related to CT scans were associated with decreased intention to screen. Therefore, education addressing these factors may increase patient motivation to pursue screening.

Motivation to have lung cancer screening has also been investigated by examining changes in intention to undergo lung cancer screening in Korean men after receiving information on the benefits and harms of LDCT (Nhung et al., 2015). Ninety-five percent of the participants indicated that they would pursue lung cancer screening after being educated on the benefits of screening and that screening intentions were stronger among current smokers.

## SAMPLE

Inclusion criteria for this study were English-speaking adults living in the Commonwealth of Virginia who were between the ages of 55 and 77 and currently smoke or are former smokers who quit in the past 15 years. Exclusion criteria included people who were never smokers, underwent lung cancer screening with LDCT, or had been diagnosed and/or treated for lung cancer. Enroll-

ment in the study was generated through a Facebook advertisement. Eligibility to participate was determined based on a brief online demographic survey. Enrollment remained open until at least 30 subjects completed the study.

## DESIGN

This study was conducted using a pre-experimental, one-group pre-test and post-test design. This study was conducted via the internet, as the basis of the study is to determine the effectiveness of using social media for patient education. The two social media platforms that were utilized were Facebook and YouTube. Institutional review board approval was obtained from Old Dominion University.

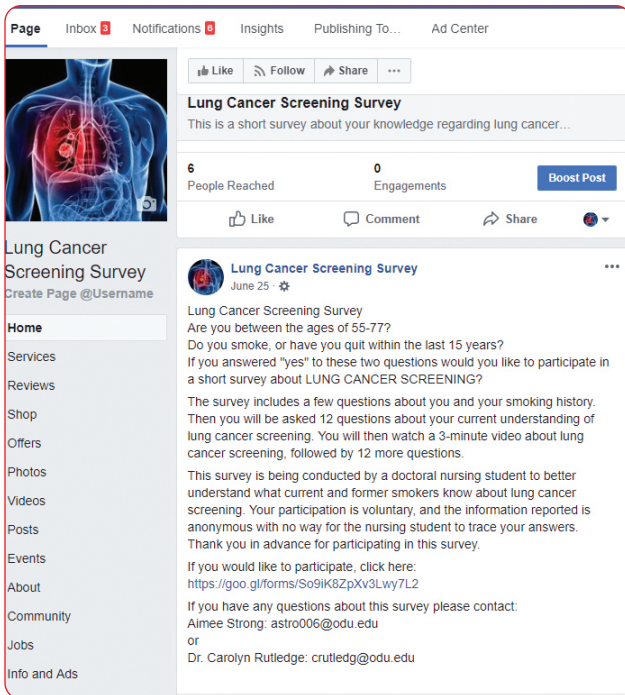
## INSTRUMENTS

Demographic variables collected included age, smoking status, gender, marital status, race, education, and health insurance coverage. The clinical variables included any history of lung cancer that precluded the subject from the study. Motivation to discuss screening with a health-care provider was also assessed. These variables were assessed using a combination of a researcher-designed form and the Lung Cancer Screening-12 (LCS-12).

The LCS-12 is a validated patient knowledge assessment tool that was developed specifically to assess change in knowledge after viewing a video-based decision aid about lung cancer screening (Lowenstein et al., 2016). The LCS-12 contains 12 questions. Each correct question is worth 1 point, and the maximum score is 12, which would indicate excellent knowledge of lung cancer screening. A score of 0 would indicate low knowledge of lung cancer screening. This tool is used with the permission of Dr. Robert Volk, the corresponding author.

## PROCEDURES

A Facebook advertisement (see Figure 1) was created to recruit potential subjects. Interested subjects clicked on a link within the advertisement that redirected them to a Facebook page containing details about the study, including general eligibility criteria. Potential subjects completed a brief questionnaire to determine eligibility and provide demographic information. Those who were eli-



**Figure 1.** The Facebook advertisement that was created to recruit potential subjects.

gible then completed the LCS-12 pre-test regarding their knowledge about lung cancer screening. Participants were directed to a brief educational video about lung cancer screening that was hosted on YouTube. After viewing the video, participants again completed the LCS-12 as a post-test to again assess their knowledge about screening. The final step asked participants to rate their motivation to discuss lung cancer screening with their health-care provider.

## RESULTS

Thirty-one subjects who ranged in age from 55 to 74 with a median age of 59 (standard deviation [SD]: 5.44) completed the study. Table 1 lists participants' sociodemographic characteristics.

## DATA ANALYSIS

IBM SPSS Statistics Version 25 was used for data analysis. Scores for each subject from the pre- and post-test were compared to assess for a change in knowledge after watching the educational video. The paired t-test was used to determine whether a difference exists in the pre- and post-test scores for each subject. This statistical test was two-sided, with a significance level of  $\alpha$  set to 0.05 a

**Table 1. Demographic Characteristics of Sample**

Demographic characteristics (n = 31)	n (%)
Between ages of 55–77	
Yes	31 (100)
Smoking status	
Current	11 (35.5)
Former	20 (64.5)
Quit after 2003	31 (100)
Have/had lung cancer	
Yes	0
Current age in years	
Mean	60.9
Median	59
Mode	56
Gender	
Female	19 (61.3)
Male	12 (38.7)
Marital status	
Married	18 (58.1)
Divorced	9 (29)
Widowed	2 (6.5)
Unmarried	2 (6.5)
Education	
High school	5 (16.1)
Some college	14 (45.2)
Bachelor's	7 (22.6)
Master's	4 (12.9)
Doctorate	1 (3.2)
Health insurance	
Yes	24 (77.4)
No	7 (22.6)
Type of health insurance	
Medicare	11 (35.5)
Other	13 (41.9)
Not applicable	7 (22.6)
Race	
Black	1 (3.2)
White	29 (93.5)
Other	1 (3.2)

priori. The mean knowledge score before watching the educational presentation about lung can-

**Table 2. Change in Mean Knowledge Score Before and After Education**

	Mean	N	Standard deviation	Standard error mean
Pre-test score	5.26	31	2.932	.527
Post-test score	8.19	31	2.007	.360

cer screening was 5.26 (SD: 2.93), and the mean knowledge score after receiving the education was 8.19 (SD: 2.01; see Table 2). The difference in knowledge was statistically significant as tested by the paired t-test (Table 3).

Level of motivation to discuss lung cancer screening with their health-care provider after viewing a lung cancer screening program on social media was also assessed using a Likert scale. Responses to this question were analyzed using descriptive statistics, including mean, mode, and SD. Subjects ranked their motivation to discuss lung cancer screening with their health-care provider on a scale of 1 to 5, with 1 being “very unlikely” and 5 being “very likely.” The mean motivation level was 3.52 with a mode of 5 and SD of 1.43 (Figure 2).

## DISCUSSION

The data show that social media can be used as a platform for educating patients about lung cancer screening. By raising awareness of not only lung cancer screening but other health screenings, providers can ultimately decrease morbidity and mortality through early detection and early treatment. Patients who receive education on cancer screenings are in a better position to make an informed decision about their health care.

## LIMITATIONS

Limitations of this study include a small sample size, participants were primarily Caucasian, and had an above-average level of education. The study was conducted over a 10-week period, limiting the ability to collect a more robust and diverse sample. The data were collected in one geographi-

cal location, although social media would allow for national representation.

## IMPLICATIONS AND DISCUSSION

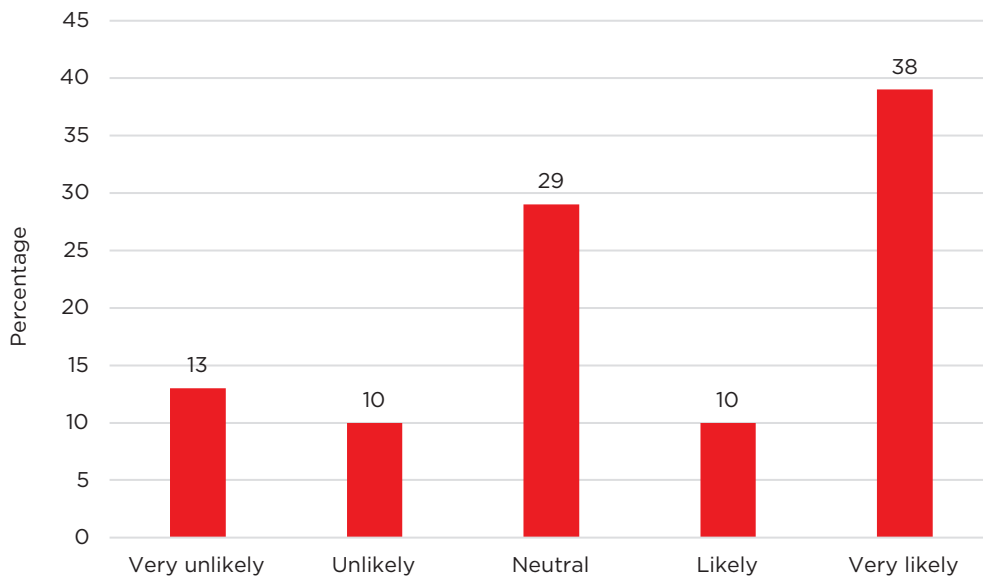
This study supports using social media to educate patients. By using the advertising metrics in Facebook, providers can target specific patient populations based on age, gender, interests, and location. Patients are able to view this information in the privacy of their own home and at their leisure.

Increasing awareness of lung cancer screening through social media may be a way to generate conversations between patients and their health-care providers. As the use of social media has become an integral part of people’s lives, patients may feel more comfortable having a conversation about lung cancer screening after seeing it on their Facebook feed, especially if they saw it on their health-care provider’s Facebook page. If a provider’s office is using social media to talk about lung cancer screening, then the provider can use this as an opportunity to address the topic with high-risk patients in the office. This may be another way to harness social media to improve uptake in lung cancer screening.

This study presents several opportunities for further research. Many respondents to the Facebook advertisement were female (61%). Future studies could explore whether gender is a factor in viewing health education on social media. Education level is also an area for future study, as 84% of the subjects in this current study had more than a high school education. Race and ethnicity is also an area for future research. Subjects

**Table 3. Difference in Knowledge Score (Paired Differences)**

	Mean	Standard deviation	Standard error mean	96% confidence interval of the difference		t	df	Sig. (2-tailed)
				Lower	Upper			
Pre-test and post-test scores	-2.935	2.744	.493	-3.942	-1.929	-5.956	30	.000



**Figure 2.** Level of motivation to discuss screening with provider (n = 31).

in this study were predominantly white (94%). Future research could investigate using social media to target minority populations to improve access to health information and thereby improve access to care.

This study also evaluated subjects' motivation to discuss lung cancer screening with their health-care providers after viewing an educational video on social media. The results show that despite having an increase in knowledge about lung cancer screening, subjects were not very motivated to discuss screening with their providers. One factor that may have influenced subjects' motivation is that 64.5% of respondents were former smokers. This population may be less motivated to pursue lung cancer screening since they no longer smoke and may have a false sense of security that they are no longer at risk for lung cancer. While the relative risk of lung cancer decreases within 5 years since quitting, it remains more than 3-fold higher than in never smokers after 25 years since quitting (Tindle et al., 2018). Therefore, it is important to educate former smokers on their continued risk for lung cancer and the role of lung cancer screening.

An additional factor related to the level of motivation to discuss lung cancer screening with a health-care provider could be the stigma associated with lung cancer. According to Cataldo and

Brodsky (2013), lung cancer patients reported the highest levels of stigma and related psychological distress compared to patients with other cancers. Carter-Harris (2015) found an association between lung cancer stigma and delayed medical help-seeking behaviors. This potential barrier can result in patients not getting screened for lung cancer and presenting with late-stage disease and worse survival. As advanced practitioners, we are often the point of contact for high-risk patients and can educate our patients about their cancer risk. Advanced practitioners can be integral in decreasing the stigma associated with lung cancer by identifying our own implicit biases around smoking, educating our patients and the public about lung cancer, and engaging our legislatures to support lung cancer research.

## CONCLUSION

This study shows that, at the very least, social media can be used to improve the knowledge of lung cancer screening. The potential for social media to engage high-risk patients in all aspects of lung cancer screening is limitless and represents an exciting opportunity to impact the health of a vulnerable population. ●

## Disclosure

The authors have no conflicts of interest to disclose.

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