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Primary care providers' knowledge, attitudes, beliefs, and practice related to lung cancer screening in five high risk communities in New York City

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Abstract

Background: Racial/ethnic minorities face stark inequalities in lung cancer incidence, treatment, survival, and mortality compared with U.S. born non-Hispanic Whites. Lung cancer screening (LCS) with low-dose computed tomography (LDCT) is effective at reducing lung cancer mortality in high-risk current and former smokers and is recommended by the U.S. Preventive Services Task Force (USPSTF). This study sought to assess primary care providers' (PCPs') knowledge, attitudes, beliefs, and practice related to LCS and the recent USPSTF guidelines in five high risk immigrant communities in New York City.

Methods: We surveyed 83 eligible PCPs between December 2016 and January 2018 through surveys sent by mail, email, and fax, administered by phone or in-person. The survey included questions about providers' clinical practice, knowledge, attitudes and beliefs related to LCS and the USPSTF guidelines. Information about patient demographics, PCPs' training background and practice type were also collected.

Results: Sixty-seven percent of respondents reported that they did not have established guidelines for LCS at their practice and 52% expressed that "vague" screening criteria influenced their referral processes for LCS. Barriers to LCS with LDCT included concerns that LDCT is not covered by insurance, patients' fears of screening results, and patients' concerns regarding radiation exposure.

Discussion: Targeted educational interventions for both PCPs and patients may increase access to recommended LCS, especially for populations at disproportionate risk for lung cancer.

Keywords

lung cancer screening; low-dose computed tomography; primary care providers; immigrants; minorities

Background

In the United States (U.S.), lung cancer is the leading cause of cancer death among both men and women and is among the three most commonly occurring cancers in all racial/ethnic groups [1]. A large and growing literature has documented stark inequalities in lung cancer incidence, treatment, survival, and mortality [1]. African Americans have the highest incidence and death rate from lung cancer of all racial/ethnic groups in the U.S., largely due to inequalities in health care [1]. Although lung cancer incidence is lowest among Asian Americans and Pacific Islanders (AAPIs) and Hispanics, AAPIs (data disaggregated by ethnicity is not routinely available) and Hispanics with lung cancer are more likely than non-Hispanic Whites (NHWs) to be diagnosed with lung cancer at a later stage of disease [2–3]. Foreign-born Asians have a 35% higher rate of non-small cell lung cancer (NSCLC) than U.S.-born Asians, likely related to higher smoking rates among foreign-born Asian men [4].

Racial/ethnic disparities in smoking behavior are a significant contributor to disparities in lung cancer incidence and mortality. Epidemiological research using nationally representative samples indicates smoking prevalence is lower among U.S. immigrants and Hispanic individuals than NHWs [5]. However, specific racial/ethnic minority and immigrant communities— particularly those concentrated in lower-income census tracts in urban cities—may be at greater risk for lung cancer than the national data suggest due to lack of access to preventive health care and tobacco cessation programs, poorer neighborhood conditions (e.g., higher prevalence of tobacco retailers and lower prevalence of supermarkets), and consequently disproportionate rates of cigarette smoking, reflecting a complex interplay between poverty, culture, and social inequality [6].

Despite low smoking rates on average across New York City (NYC), there are population pockets with much higher rates. Foreign-born Chinese American men in NYC have a reported smoking prevalence ranging from 29% to 34%, compared to 15% for all New Yorkers [7]. Lung cancer deaths increased 70% among Chinese New Yorkers from 2000 to 2014, while decreasing 16.4% in NYC overall during the same time period [8]. Smoking prevalence was 20.8% in a random sample of 1,664 residents (50.3% Hispanic, 40.2% African American) in ten NYC public housing developments in Central/East Harlem [9]. In the South Bronx, predominantly populated by Hispanics and African Americans, approximately 17% are current smokers vs. 10.2% in the comparatively NHW neighborhood of the Upper East Side, paralleling significant gaps in cancer incidence and mortality rates between these NYC neighborhoods [10].

In December 2013, the U.S. Preventive Services Task Force (USPSTF) began recommending annual lung cancer screening (LCS) with low-dose computed tomography (LDCT) in adults age 55–80 with a 30 pack-year history and who currently smoke or have quit within the past 15 years. The USPSTF found that LDCT annual screening in a defined population of high-risk individuals could prevent a substantial number of lung cancer–related deaths. In November 2014 the Centers for Medicare and Medicaid Services extended coverage for LDCT to Medicare beneficiaries who met these criteria [11]. Yet uptake of LCS with LDCT remains generally low: a study using National Health Interview Survey (NHIS) data found the percentage of eligible smokers who reported LCDT screening remained consistently low in the years after the new USPSTF guidelines were released (3.3% in 2010, 3.9% in 2015) [12]. Since the release of the USPSTF’s recommendation, there have been no published data on LCS rates among racial/ethnic minorities.

For most adults, PCPs are the first point of contact with the healthcare system. PCPs play a critical role in offering preventive healthcare, facilitating early diagnosis, and identifying patients who qualify for cancer screenings such as LCS [13]. Indeed, while the Centers for Medicare and Medicaid Services (CMS) provide coverage for LCS, a written referral from a qualified provider is required [14]. Therefore, successful implementation of LCS programs requires PCPs to adhere to the USPSTF’s screening guidelines. In the present study, PCPs’ knowledge, attitudes, beliefs, and practice related to LCS and the recent USPSTF guidelines were assessed in five high risk communities in NYC: Central/East Harlem (62% African American and 23% Hispanic), the South Bronx (39% African American and 58% Hispanic), Flushing Chinatown, Manhattan Chinatown and Sunset Park, Brooklyn (selected on the

basis of their high concentration of Chinese residents who may face increased lung cancer risk due to high smoking rates and immigrant status) [15]. The resulting data can inform the development of an educational intervention aimed at providers who serve patients at high risk for lung cancer.

Methods

The LCS survey was adapted from the National Cancer Institute's National Survey of Primary Care Physicians' Cancer Screening Recommendations and Practices [16]. The survey included the following areas of inquiry: 1) aggregate patient demographic information (i.e., percentage of patients by age, race/ethnicity, native language, immigrant status, insurance status); 2) questions about providers' clinical practice related to LCS and the USPSTF guidelines; and 3) knowledge and beliefs related to LCS and the USPSTF guidelines.

Study staff from the Immigrant Health and Cancer Disparities Center at Memorial Sloan Kettering Cancer Center collated from publicly available resources a list of PCPs who serve the identified communities of interest: Central/East Harlem, South Bronx, Flushing Chinatown (Queens), Manhattan Chinatown, and Sunset Park (Brooklyn). The initial provider list for East and Central Harlem and the South Bronx was developed using the following sources: Community Health Care Association of New York State (CHCANY), Health Resources and Services Administration (HRSA), Metroplus Provider Directories, and Zoc Doc, an online directory of medical professionals. The zip codes for our catchment areas of East Harlem (10029 and 10035), Central Harlem (10026, 10027, 10030, 10037, and 10039), and the South Bronx (10451, 10452, 10453, 10454, 10455, 10456, 10457, 10459, 10460, and 10474) were employed for the search. Within these catchment areas, 146 PCPs were identified. These providers practiced in private primary care practices, federally qualified/community health centers and hospitals/medical centers.

The list of providers serving the NYC Chinese community was developed using the Coalition of Asian Independent Practice Association (CAIPA) Doctor Magazine, which publishes a list of providers located in Chinese communities in NYC, totaling over 800 specialty providers and PCPs. Further, to identify additional PCPs, staff conducted field visits (went block to block) to the most heavily Chinese populated neighborhoods in NYC according to the U.S. Census Bureau, including Chinatowns in Manhattan (zip codes 10001, 10002, 10007, 10013, and 10038), Flushing, Queens (zip codes 11354 and 11355), and Sunset Park, Brooklyn (zip code 11220). A list of 167 PCPs was compiled in the above heavily Chinese populated zip code areas from field visits and the CAIPA list.

The study was deemed exempt by Memorial Sloan Kettering Cancer Center's Institutional Review Board, hence PCPs gave their verbal agreement to participate (no formal consenting process was required). Providers were approached by bilingual study staff by telephone and/or in person to assess interest in participation. Among providers willing to participate, study staff administered the LCS survey over the phone or in-person at the provider's practice, depending on provider preference. If requested, providers were permitted to self-

administer the survey, with study staff present to ensure survey completion and to answer questions. Providers were compensated \$50 for their participation.

Survey results were entered into UnityWeb, a secure web-based database application. Descriptive statistics were performed to determine providers' demographic characteristics and to examine providers' knowledge, attitudes, and beliefs related to LCS and the recent USPSTF guidelines. Bivariate analyses were conducted to determine the relationship between provider/practice characteristics and knowledge, attitudes, and beliefs related to LCS.

Results

All 313 PCPs on our list were approached by phone, among whom 170 were also approached in person. A total of 275 site visits were done in an attempt to reach these providers. One hundred and four refused due to lack of time or interest, 123 were unable to be reached, and 3 were found to not be PCPs. Seventy-two surveys were self-administered, eight were research assistant-administered in-person and 3 were administered over the phone.

Provider and Practice Characteristics

A total of 83 providers completed the survey; of these, 40% practiced in the South Bronx (n=3) or Central (n=21)/East (n=9) Harlem, 51% in the Chinese communities (Manhattan Chinatown (n=19), Sunset Park, Brooklyn (n=16) and Flushing, Queens (n=7), and for 10%, zip code data were missing (n=8). Seventy-three percent of respondents had M.D. degrees, 7% had Doctor of Osteopathic Medicine (D.O.) degrees, 13% were Family Nurse Practitioners (FNPs), and 6% were Physicians Assistants (PAs). Sixty-nine percent were foreign-born and 45% had obtained their medical degree in a country other than the U.S. Sixty-four percent worked in a practice that was affiliated with an academic institution. Most providers (88%) reported using full electronic medical records (EMR) in their practice.

Patient Population Characteristics

Providers reported the largest percentages of their patients were aged 36–54 years (31%) and 55–80 years (32%). Providers reported that 60% of their patients were foreign born. The majority of providers reported that their patients were insured by Medicare or Medicaid; 29% reported 21–50% of their patients were covered by Medicare, and 27% reported that 50–70% of their patients were covered by Medicaid.

Almost all providers (94%) reported that they ask almost all of their patients (>90%) in their practice about their cigarette smoking behavior; 25% reported that 11–20% of their patients are current smokers, 19% that 21–30% are smokers, 19% that 31–50% are smokers, 12% that 51–70% are smokers, and 7% that 71–100% are smokers. Forty percent of providers reported that they have referred 0–10% of their patients who smoked to a smoking cessation program, while 24% referred 71–100% of their patients who smoked to a cessation program.

Provider Beliefs Related to Effectiveness of Lung Cancer Screening Modalities

Providers were asked about how effective they believe different screening modalities are in reducing lung cancer mortality in asymptomatic patients age 50 and older (Table 1). More than a quarter (28%) of providers believed that LDCT is very effective among never smokers, 41% believed that it is not effective, and a quarter (26%) did not know. Nearly half (49%) of providers believed that LDCT is very effective among former smokers, while only 9% believed that it is not effective. Nearly two-thirds (63%) believed that LDCT is very effective among current smokers, 5% believed that it is not effective, and 11% reported that they did not know. Fifty-five percent of providers believed that the USPSTF recommends the use of LCS in asymptomatic patients.

Provider Recommendations for Lung Cancer Screening in 5 Different Clinical Scenarios

Providers were asked about whether they would recommend LCS (chest x-ray, sputum cytology, both chest x-ray & sputum cytology, LDCT, or no screening) for asymptomatic patients in 5 different clinical scenarios (Table 2). Sixty seven percent of providers correctly stated they would recommend LDCT for the scenario in which it was clinically indicated according to the USPSTF guidelines (healthy 60-year-old female, current smoker – 1 pack a day since age 15). For the other 4 scenarios in which LDCT was not indicated according to the USPSTF guidelines, only 31–46% of providers correctly recommended “no screening”.

Providers were also asked about how much socioeconomic factors and cancer beliefs influenced the likelihood of a patient obtaining LCS after a referral. “Very” or “extremely influential” factors included a patient not having insurance (63% of providers), if a patient’s insurance did not cover the exam cost (69%), and not having time for screening (43%). Factors that providers reported would have some “some influence” included the patient being afraid of what he/she might discover (43%), the patient not believing that he/she is at risk (32%), the patient being worried about radiation exposure (41%), the patient thinking there should be symptoms before testing (36%), and the patient being afraid of a diagnosis of cancer (33%).

Providers’ Experiences with Lung Cancer Screening

Providers were next asked a series of questions about their experience with LCS (Table 3). Only 14% strongly agreed with the statement “I have access to clear guidelines for follow up after lung cancer screening”. Sixty-seven percent of providers stated they did not have established guidelines for LCS at their practice. Seventy-six percent stated they “agree” or “strongly agree” with the statement “Patients are receptive when discussing lung cancer screening tools”, 84% with the statement “The ease of making lung cancer screening referrals positively influences my ability to refer appropriate patients”, 52% with the statement “Vague screening criteria for lung cancer screening influences referral of patients to lung cancer screening”, 72% with “If LDCT were to become available in my area, it would positively influence my ability to refer appropriate patients”, and 65% with “Utilizing an electronic medical record positively influences my ability to refer patients”.

Bivariate Analyses of Provider/Practice Characteristics and Knowledge, Attitudes, and Beliefs related to Lung Cancer Screening

In bivariate analyses, foreign-born providers (47%) were more likely to believe that low LDCT is very or somewhat effective in reducing lung cancer mortality for never smokers compared with US-born providers (17%) ($P=0.01$). Providers with an MD or DO degree were more likely to select the correct answer in two out of the five different clinical scenarios compared to providers without an MD or DO (38% vs 6%, $P=0.02$; 73% vs 44%, $P=0.03$), were less likely to believe that sputum cytology is very or somewhat effective in reducing mortality related to lung cancer for high risk patients (27% vs 69%, $P<0.01$), were less likely to agree or strongly agree that the risk versus benefit for LDCT does NOT support referral for appropriate patients (13% vs 40%, $P=0.02$), and were more likely to believe they had access to clear guidelines for follow-up after LCS (60% vs 31%, $P=0.04$). In one of the five clinical scenarios, providers affiliated with an academic institution were more likely to select the correct answer compared to those who were unaffiliated (44% vs 15%, $P=0.01$), and less likely to agree or strongly agree that the medical literature supports the use of standard dose CT in LCS (35% vs 64%, $P=0.02$).

Providers in the 3 Chinese communities were more likely than those in the South Bronx/Central/East Harlem to believe that sputum cytology is very or somewhat effective in reducing lung cancer mortality for asymptomatic patients age 50 or older among never smokers (25.0% vs. 0%, $P<0.01$). South Bronx/Central/East Harlem providers were more likely than providers in the Chinese communities to report that patient fear of a cancer diagnosis (56.3% vs. 16.3%, $P<0.001$) and patient belief that there should be symptoms before testing (50.0% vs. 20.4%, $P<0.01$) were extremely or very influential on obtaining LCS after a referral.

Discussion

Despite USPSTF recommendations for LCS with LDCT, the majority of surveyed PCPs who serve high-risk populations in NYC reported that they did not have established guidelines for LCS at their practice. In addition, a large proportion were unable to correctly identify clinical scenarios in which LCS with LDCT is recommended or not recommended. Only half believed that LDCT was very effective among former smokers and a majority expressed that “vague” screening criteria influenced their referral processes for LCS. A number of barriers to LCS with LDCT were identified, including concerns that LDCT is not covered by insurance, patients’ fears of screening results, and patients’ concerns regarding radiation exposure.

Provider factors associated with knowledge of USPSTF guidelines on LCS with LDCT were also analyzed. Having an MD or DO degree and being affiliated with an academic institution were significantly associated with accurate knowledge of guidelines. This suggests that gaps in knowledge of LCS guidelines may be more pronounced among FNPs and PAs, which has implications for other underserved communities where non-physician clinicians may be more utilized due to physician shortages [17].

Our results are consistent with other studies of PCPs' knowledge and utilization of LCS with LDCT showing that PCPs lacked awareness of the USPSTF guidelines on LCS [18–19]. Though a majority of PCPs in the present survey correctly stated they would recommend LDCT for the scenario in which it was clinically indicated, a substantial minority (15%) recommended chest x-ray only or no screening (10%). This suggests that significant barriers remain to successful implementation of USPSTF recommendations in communities with disproportionate lung cancer risk. Foreign-born providers were more likely to believe that LDCT is very or somewhat effective in reducing lung cancer mortality for never smokers, indicating that clinician practice continues to lag behind evidence and guidelines.

This study, taken together with other investigations of LCS knowledge and utilization by PCPs [18–19], has important implications. Educating PCPs regarding LCS guidelines may improve utilization of LDCT when clinically indicated. A majority of PCPs in the present study routinely collect information on smoking history, use EMR systems, and agreed with the statement “Utilizing an electronic medical record positively influences my ability to refer patients”, suggesting that systemic interventions (e.g. automatic notifications in EMR systems) could increase PCPs' adherence with USPSTF guidelines for LCS with LDCT [20].

PCPs identified potential barriers to LCS that may be especially relevant for the high-risk communities they serve. One concern was that LDCT is not covered by insurance. Given that racial/ethnic minorities and immigrants are less likely than native-born Whites to have health insurance and access to quality healthcare [21], policy changes to increase coverage of eligible patients will likely increase appropriate LDCT referrals. PCPs also identified barriers to LCS related to patients' beliefs, i.e. patients' fears of screening results and concerns regarding radiation exposure. These results are consistent with previous studies showing that fatalistic beliefs, fear of radiation exposure, and mistrust of the healthcare system were more common among minority patients and independently associated with decreased intention to screen for lung cancer [22–23]. Different cultural perspectives on cancer prevention and screening tests should be considered when making screening recommendations to minority patients.

This study was limited by its non-representative sample and somewhat low response rate, 27%, though this rate was higher than those reported in prior studies [18]. However, this study is strengthened by its intentional recruitment of PCPs serving populations at high risk for lung cancer. Their perceptions, knowledge, and beliefs regarding LCS are important to understand in order to mitigate risk and increase the likelihood of appropriate LCS utilization in underserved communities. Results suggest that physician, system, and patient level barriers contribute to underutilization of LCS among eligible patients in the five high risk communities of interest. Targeted educational interventions for both PCPs and patients may reduce these barriers and increase access to recommended LCS, especially for populations at disproportionate risk for lung cancer. In addition, numerous studies have demonstrated that a provider's recommendation is the primary facilitator of cancer screening uptake and completion (for a review, see [24]), particularly in immigrant and minority communities in which doctors are considered authority figures whose recommendations greatly influence patients' healthcare decisions [25]. PCPs who serve these vulnerable

populations may therefore be particularly well suited to increase uptake of LDCT among eligible patients.

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Table 1

Provider Beliefs Related to Effectiveness of Lung Cancer Screening Modalities

	N	%
How effective do you believe these screening modalities are in reducing lung cancer mortality for each type of asymptomatic patient aged 50 and older?		
Never Smokers		
Chest x-ray		
Very effective	9	11.69
Somewhat effective	17	22.08
Not effective	37	48.05
Don't know	14	18.18
Missing	6	~
Sputum Cytology		
Very effective	3	3.95
Somewhat effective	7	9.21
Not effective	37	48.68
Don't know	29	38.16
Missing	7	~
Low dose CT (LDCT)		
Very effective	22	28.21
Somewhat effective	4	5.13
Not effective	32	41.03
Don't know	20	25.64
Missing	5	~
Standard dose CT		
Very effective	19	25.33
Somewhat effective	5	6.67
Not effective	31	41.33
Don't know	20	26.67
Missing	8	~
Former Smokers		
Chest x-ray		
Very effective	15	19.74
Somewhat effective	29	38.15
Not effective	27	35.53
Don't know	5	6.58
Missing	7	~
Sputum Cytology		
Very effective	8	10.81
Somewhat effective	17	22.97
Not effective	29	39.19
Don't know	20	27.03
Missing	9	~

	N	%
Low dose CT (LDCT)		
Very effective	39	48.75
Somewhat effective	24	30.00
Not effective	7	8.75
Don't know	10	12.50
Missing	3	~
Standard dose CT		
Very effective	26	38.23
Somewhat effective	14	20.59
Not effective	12	17.65
Don't know	16	23.53
Missing	15	~
Current Smokers		
Chest x-ray		
Very effective	22	29.33
Somewhat effective	24	32.00
Not effective	24	32.00
Don't know	5	6.67
Missing	8	~
Sputum Cytology		
Very effective	10	13.70
Somewhat effective	16	21.92
Not effective	29	39.72
Don't know	18	24.66
Missing	10	~
Low dose CT (LDCT)		
Very effective	50	62.50
Somewhat effective	17	21.25
Not effective	4	5.00
Don't know	9	11.25
Missing	3	~
Standard dose CT		
Very effective	31	44.29
Somewhat effective	11	15.71
Not effective	13	18.57
Don't know	15	21.43
Missing	13	~

Table 2

Provider Recommendations for Lung Cancer Screening in 5 Different Clinical Scenarios

	N	%
Which of the following lung cancer screening tests would you recommend for asymptomatic patients?		
1.		
Healthy 60-year-old female		
Former smoker (1 pack a day for 15 years)		
Quit 10 years ago		
<i>[low dose CT indicated per UPSTF guideline]</i>		
No Screening	36	43.90
Chest x-ray	24	29.27
Sputum cytology	0	0.00
Both chest x-ray & sputum cytology	2	2.44
Low dose CT	17	20.73
Other, please fill in		
Both chest x-ray and sputum cytology and low dose CT	1	1.22
Chest x-ray and low dose CT	1	1.22
Chest x-ray followed by sputum cytology then low dose CT	1	1.22
Don't know/unsure	0	0.00
Missing	1	~
2.		
Healthy 60-year-old male Never smoked		
Occupational radon exposure: 20 years		
25 years' exposure to second hand smoke from spouse		
<i>[no screening indicated per UPSTF guideline]</i>		
No Screening	25	30.87
Chest x-ray	21	25.94
Sputum cytology	0	0.00
Both chest x-ray & sputum cytology	4	4.94
Low dose CT	25	30.87
Other, please fill in		
Both no screening and sputum cytology	1	1.23
Both chest x-ray and sputum cytology and low dose CT	1	1.23
Chest x-ray and low dose CT	1	1.23
Chest x-ray followed by sputum cytology then low dose CT	1	1.23
Refer to pulmonologist	1	1.23
Don't know/unsure	1	1.23
Missing	2	~
3.		
Healthy 60-year-old female		
Current smoker (1 pack a day since age 15)		
<i>[no screening indicated per UPSTF guideline]</i>		
No screening	8	9.76
Chest x-ray	12	14.63
Sputum cytology	0	0.00
Both chest x-ray & sputum cytology	4	4.88
Low dose CT	55	67.07

	N	%
Other, please fill in		
Both chest x-ray and sputum cytology and low dose CT	1	1.22
Chest x-ray and low dose CT	1	1.22
Chest x-ray followed by sputum cytology then low dose CT	1	1.22
Don't know/unsure	0	0.00
Missing	1	~
4.		
Healthy 50-year-old male		
Current smoker (half a pack a day for 20 years)		
[no screening indicated per UPSTF guideline]		
No Screening	29	35.37
Chest x-ray	16	19.51
Sputum cytology	0	0.00
Both chest x-ray and sputum cytology	4	4.88
Low dose CT	29	35.37
Other, please fill in		
Both chest x-ray and sputum cytology and low dose CT	1	1.22
Chest x-ray and low dose CT	1	1.22
Chest x-ray and sputum cytology then low dose CT	1	1.22
Don't know/unsure	1	1.22
Missing	1	~
5.		
Healthy 55-year-old male		
Former smoker (2 pack a day for 20 years)		
Quit 17 years ago		
[no screening indicated per UPSTF guideline]		
No Screening	38	46.34
Chest x-ray	17	20.73
Sputum cytology	0	0.00
Both chest x-ray & sputum cytology	3	3.66
Low dose CT	21	25.61
Other, please fill in		
Both chest x-ray and sputum cytology and low dose CT	1	1.22
Chest x-ray and low dose CT	1	1.22
Chest x-ray and sputum cytology then low dose CT	1	1.22
Don't know/unsure	0	0.00
Missing	1	~

Table 3

Providers' Experiences with Lung Cancer Screening

	N	%
Patients are receptive when discussing lung cancer screening tools		
Strongly Disagree	0	0.00
Disagree	1	1.20
Neutral	19	22.89
Agree	50	60.25
Strongly Agree	13	15.66
Insurance coverage for a lung screening test influences referral of patients for testing		
Strongly Disagree	2	2.41
Disagree	8	9.64
Neutral	3	3.61
Agree	37	44.58
Strongly Agree	33	39.76
If a patient is covered by Medicaid, this negatively influences referral of patients for testing		
Strongly Disagree	15	18.29
Disagree	35	42.68
Neutral	21	25.61
Agree	9	10.98
Strongly Agree	2	2.44
Missing	1	~
If a patient is covered by Medicare, this negatively influences referral of patients for testing		
Strongly Disagree	15	18.29
Disagree	43	52.44
Neutral	13	15.85
Agree	9	10.98
Strongly Agree	2	2.44
Missing	1	~
Access to sites that screen for lung cancer influences referral of appropriate patients for lung cancer screening		
Strongly Disagree	5	6.17
Disagree	16	19.75
Neutral	11	13.58
Agree	40	49.39
Strongly Agree	9	11.11
Missing	2	~
The ease of making lung cancer screening referrals positively influences my ability to refer appropriate patients		
Strongly Disagree	2	2.41
Disagree	5	6.02
Neutral	6	7.23
Agree	44	53.01
Strongly Agree	26	31.33

	N	%
Lack of time influences my ability to discuss lung cancer screening with patients		
Strongly Disagree	10	12.20
Disagree	29	35.36
Neutral	12	14.63
Agree	23	28.05
Strongly Agree	8	9.76
Missing	1	~
Vague screening criteria for lung cancer screening influences referral of patients to lung cancer screening		
Strongly Disagree	2	2.41
Disagree	24	28.92
Neutral	14	16.87
Agree	32	38.55
Strongly Agree	11	13.25
Screening tests lead to unnecessary procedures due to false positives		
Strongly Disagree	5	6.10
Disagree	27	32.92
Neutral	26	31.71
Agree	19	23.17
Strongly Agree	5	6.10
Missing	1	~
The guidelines are clear for who should be referred for Low Dose CT lung cancer screening		
Strongly Disagree	2	2.44
Disagree	11	13.41
Neutral	22	26.83
Agree	34	41.47
Strongly Agree	13	15.85
Missing	1	~
The guidelines are clear for who should be referred for Chest x-ray		
Strongly Disagree	4	4.88
Disagree	26	31.71
Neutral	24	29.27
Agree	22	26.83
Strongly Agree	6	7.32
Missing	1	~
The guidelines are clear for who should be referred for Sputum Cytology		
Strongly Disagree	5	6.02
Disagree	29	34.94
Neutral	25	30.12
Agree	18	21.69
Strongly Agree	6	7.23
The risk versus benefit for low dose CT does not support referral in appropriate patients		
Strongly Disagree	12	14.63

	N	%
Disagree	37	45.13
Neutral	18	21.95
Agree	12	14.63
Strongly Agree	3	3.66
Missing	1	~
The ready availability of Chest X-ray positively influences my ability to refer appropriate patients		
Strongly Disagree	5	6.02
Disagree	21	25.30
Neutral	15	18.07
Agree	30	36.15
Strongly Agree	12	14.46
The ready availability of sputum cytology positively influences my ability to refer appropriate patients		
Strongly Disagree	9	10.84
Disagree	30	36.15
Neutral	24	28.92
Agree	17	20.48
Strongly Agree	3	3.61
The lack of availability of Low Dose CT sites influences my ability to refer appropriate patients		
Strongly Disagree	7	8.43
Disagree	27	32.53
Neutral	11	13.25
Agree	30	36.15
Strongly Agree	8	9.64
If Low Dose CT were to become available in my area, it would positively influence my ability to refer appropriate patients		
Strongly Disagree	2	2.41
Disagree	4	4.82
Neutral	17	20.48
Agree	41	49.40
Strongly Agree	19	22.89
Utilizing an electronic medical record positively influences my ability to refer patients		
Strongly Disagree	7	8.43
Disagree	8	9.64
Neutral	14	16.87
Agree	38	45.78
Strongly Agree	16	19.28
I have access to clear guidelines for follow up after lung cancer screening		
Strongly Disagree	1	1.20
Disagree	17	20.48
Neutral	18	21.69
Agree	30	36.15
Strongly Agree	12	14.46
Not sure	5	6.02

	N	%
Does your practice have established guidelines for lung cancer screening?		
Yes	26	31.71
No	55	67.07
Do not know/Unsure	1	1.22
Missing	1	~

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