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Lung Cancer Screening Practices in North Carolina Computed Tomography Facilities

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Abstract

Background—The burden of lung cancer in the United States is staggering, with more Americans dying from lung cancer than the next four most common cancers combined. With endorsement of lung cancer screening by the United States Preventive Services Task Force and reimbursement by the Centers for Medicare and Medicaid Services (CMS), the number screened for lung cancer with low-dose computed tomography (LDCT) is anticipated to rise in the near future.

Methods—In 2015, we conducted a cross section study of mailed surveys to 112 American College of Radiology (ACR) computed tomography (CT) facilities across North Carolina to examine recommended guidelines for lung cancer screening, referral patterns, and patient tracking methods. We describe the survey results and compare findings with surveys of academic medical centers.

Results—Among 48 respondents (response rate=42.9%), 54.2% offer lung cancer screening with LDCT (93.1% community and 6.9% academic settings) and of these, 70.8% use ACR/CMS guidelines. In lung cancer screening facilities, reported patient volumes are low (average 8 patients screened per month, range: 0–30) and patient tracking occurs in 72% of facilities.

Conclusion—Among our predominately community based sample of facilities, we found variation in lung cancer screening guideline usage, number of patients screened, and tracking methods.

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Conflict of Interest

None

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Introduction

In 2016 in the U.S. an estimated 224,390 new cases of lung cancer will be diagnosed and 158,080 deaths from the disease will occur.¹ The 5-year survival rate for lung cancer is 18% with most patients being diagnosed with advanced incurable disease. Thoughts about screening for lung cancer have changed dramatically since the National Lung Screening Trial (NLST) reported that annual screening with low-dose computed tomography (LDCT) in high-risk patients yields a 20% relative risk reduction in lung cancer mortality compared to chest X-ray.² The United States Preventive Services Task Force (USPSTF) recommended lung cancer screening for high risk patients in December 2013³ and by February 2015, the Centers for Medicare and Medicaid Services (CMS) began covering annual screens for eligible patients.⁴ While prior studies of U.S. academic medical centers and physician specialty groups found variation in lung cancer screening practices, there is little evidence on screening practices from non-academic settings.^{5,6} Therefore, we surveyed computed tomography (CT) facilities in North Carolina to evaluate lung cancer screening practices in both academic and community settings.

Methods

Using the American College of Radiology's (ACR) website⁷, we identified all CT accredited facilities as of September 25, 2015 in North Carolina (n=217). We contacted each facility via telephone up to three times to identify a lead radiologist, imaging center manager, or CT technologist to address the survey to. We excluded urology facilities (n=19) as they did not perform chest CT, facilities where we were unable to make contact after 3 attempts (n=52), facilities who reported not performing chest CT (n=8), and facilities who declined to participate (n=9). For 17 lead CT technologists who worked at multiple facilities, we randomly selected one facility to survey so as not to overly burden the technologist. Our final study sample included 112 facilities.

We conducted a mailed survey to the 112 active North Carolina CT facilities from November through December of 2015. The survey questions were developed through collaboration with an Advisory Group, which consisted of an internal medicine physician, primary care physician, thoracic radiologist, pulmonary physician, pathologist, survey methodologist, and epidemiologist. We included 26 items focused on facility demographics (type and location, staff, and patient volume) and lung cancer screening practices (patient referral patterns, screening procedures, and patient tracking methods). The survey was designed to assess the appropriateness of screening as defined by the ACR/CMS guidelines and included questions regarding the type of screening offered and knowledge of the shared decision making requirement.

The mailed survey was deployed using the methods of Dillman et al, which included pilot testing the survey at 3 out-of-state CT facilities and performing 6 attempts of contact during survey deployment.⁸ As some facility contacts worked at multiple facilities, the survey instructions directed the respondent to answer questions based on the facility that the survey was addressed to. Survey responses were double entered into a RedCAP database, then exported for analysis. We describe our survey findings and discuss how these compare with

findings from academic settings. This study was approved by the University of North Carolina Institutional Review Board.

Results

Of the 48 returned surveys (42.9% response rate), 35% were part of a large hospital network, 21% were private solo or group practices, 21% were freestanding clinics, 33% were hospital emergency or outpatient departments, and 6% were other (Table 1). Almost half (45.7%) of facilities self-reported as rural, 26.1% as suburban, and 28.3% as urban. The overall patient volume varied for each facility with the number of patients seen per month ranging from 125 to 40,000 (median of 2,000). Across facilities, the median number of board certified general radiologists was 6 with an interquartile range of 2–25 and the median number of board certified thoracic radiologists was 2 with an interquartile range of 0–4. The number of CT technologists at the responding facilities ranged from 1 to 20 with a median of 4.

Lung cancer screening with LDCT is offered at 54.2% of responding facilities with 18.8% planning to offer screening in the next 3 to 6 months (Table 2). Among facilities that offer screening with LDCT (n=26), 15 (57.7%) reported being an ACR designated lung cancer screening center and another 8 (30.8%) plan to obtain ACR designation in the future. Among lung cancer screening facilities, 92.3% reported implementing guidelines with 70.8% of these using ACR/CMS guidelines. All facilities that reported using the ACR/CMS guidelines were familiar with the CMS shared decision-making requirement. There was wide variation in the number of patients screened per month, ranging from 0 to 30 with a median of 5 patients. The majority of lung cancer screening facilities reported having patients referred to them for screening (n=25; 96.2%), with most patients being referred from outside physicians (81.5%) or in-network/health system physicians (80.0%). In terms of patient tracking for lung cancer screening, 38.5% of facilities reported using a screening coordinator, 23.1% reported using an electronic patient tracking method, and 27.6% reported not having a patient tracking method in place. Of those who reported using an electronic tracking method, the majority (66.7%) reported using EPIC.

Discussion

Among our predominately community based sample of facilities, we found variation in lung cancer screening guideline usage, number of patients screened, and tracking methods. In our study, 70.8% of facilities with a screening program in place in 2015 reported using ACR/CMS guidelines for screening patients. In contrast, Boiselle et al found that among academic medical centers in 2015, 35% used NLST criteria, 24% used CMS, and 24% used USPSTF to identify and decide which patients to screen.⁵ A 2014 survey to Lung Cancer Screening Alliance members found that 40% of respondents used National Comprehensive Cancer Network and 32% used the NLST screening eligibility guidelines.⁹

We found the number of patients screened per month to be low, which is similar to results of other surveys of lung cancer screening. For instance, the Boiselle study reported that the most common response to the number of patients screened was 1 to 5 patients per week and that they observed a modest increase in patient volume from 2013 to 2015.⁵ A survey

conducted among Society of Thoracic Radiology members indicated that 28% of the institutions reported more than 50 patients screened in the 12 months before administration of the 2013 survey compared with 50% in 2013.⁶

To our knowledge, no prior surveys of lung cancer screening facilities have reported on patient tracking, which is an essential component of a lung cancer screening program. We found most facilities used a screening coordinator or electronic tracking system but that for 27.6% of facilities, no tracking system was in place. This is an area of concern as appropriate follow-up is critical for lung cancer screening programs to be effective.

Our study included CT facilities in one geographic area and it is possible that our findings may not be generalizable to the entire U.S. However, we included all CT facilities in North Carolina and had a mixture of facility types from rural, urban and suburban areas respond.

As lung cancer screening with LDCT diffuses across the U.S., it is essential to monitor screening practices, particularly in community settings where a significant proportion of the population will be screened. Although the NLST demonstrated a mortality benefit in those screened with LDCT, it remains to be seen how this will translate outside of a clinical trial. With an estimated 8.4 million people eligible for lung cancer screening¹⁰ it is important to maintain standardized screening practices. Facilities must work as a multidisciplinary team to provide consistent patient eligibility determination, referral patterns, and tracking mechanisms to ensure the safety and completeness of care for all screened individuals.

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Summary Sentence

Among our predominately community based sample of facilities, we found variation in lung cancer screening guideline usage, number of patients screened, and tracking methods.

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Table 1

Computed Tomography Facility Demographics of Survey Respondents in North Carolina, 2015

Characteristic	N (%) N=48
Self-reported Facility Type *	
Part of a large hospital network	17 (35.4)
Private solo or group practice	10 (20.8)
Freestanding clinic	10 (20.8)
Hospital emergency or outpatient department	16 (33.3)
Academic Centers	2 (4.2)
Non-federal government clinic	1 (2.1)
Geographic location of facility	
Rural	21 (45.7)
Suburban	12 (26.1)
Urban	13 (28.3)
<i>Missing</i>	2 (---)
Average Number of Patients seen per month	
Median (IQR)	2,000 (720 – 4,000)
Range	125 – 40,000
Number of board certified radiologists	
General radiologists	
Median (IQR)	6 (2 – 25)
Range	0 – 70
Thoracic radiologists	
Median (IQR)	2 (0 – 4)
Range	0 – 10
Number of CT technologists at facility	
Median (IQR)	4 (1.5 – 9.0)
Range	1 – 20
Types of imaging offered *	
Radiography	44 (91.7)
Low-Dose Computed Tomography (LDCT)	30 (62.5)
Magnetic Resonance Imaging (MRI)	37 (77.1)
Computed Tomography (CT)	47 (97.9)
Fluorodeoxyglucose positron emission tomography (FDG-PET)	40 (83.3)
Ultrasound	42 (87.5)

* Respondents could select multiple responses

Table 2

Lung Cancer Screening Practices reported by Computed Tomography Facilities in North Carolina, 2015

Among ALL Facilities	N (%) N=48
Lung cancer screening offered at the facility	
Yes	26 (54.2)
No	13 (27.1)
Not currently but plan to in the future	9 (18.8)
Among those who plan to begin lung cancer screening in the future (n=9), when:	
Next 3 months	7 (14.6)
Next 6 months	2 (4.2)
Among Facilities offering Lung Cancer Screening	
N=26	
Facility is American College of Radiology designated lung cancer screening center	
Yes	15 (57.7)
No	3 (11.5)
Not currently but plan to be in future	8 (30.8)
Facility implemented guidelines for lung cancer screening	
Yes	24 (92.3)
No / Missing	2 (7.7)
If guidelines have been implemented (n=24), which guidelines?	
American College of Radiology / Center for Medicare & Medicaid Services	17 (70.8)
National Comprehensive Cancer Network	1 (4.2)
American College of Radiology and I-ELCAP	1 (4.2)
None (patient eligibility is determined by another provider)	2 (8.3)
Missing	3 (12.5)
Average # patients screened for lung cancer per month	
Median (IQR)	5.0 (1.0–15.0)
Mean (SD)	8.5 (8.9)
Range	0.0–30.0
Level of familiarity with CMS shared decision making	
Extremely	8 (30.8)
Moderately/Somewhat	10 (38.5)
Slightly	4 (15.4)
Not at all	4 (15.4)
Patients referred to this facility for lung cancer screening	
Yes	25 (96.2)
No	1 (3.8)
If patients are referred (n=25) for lung cancer screening, what is referral method*	

Among ALL Facilities	N (%) N=48
Outside physician referral	20 (80.0)
Physician referral within network/health system	16 (64.0)
Patient self-referral	2 (8.0)
Other	0(0.0)
Tracking methods used for lung cancer screening patients *	
Electronic tracking database	6 (23.1)
Screening coordinator	10 (38.5)
Refer to outside facility	0 (0.0)
Center for Medicare & Medicaid Services tracking	5 (19.2)
Other	6 (23.1)
We do not track	6 (27.6)
If electronic system (n=6), which one is used	
EPIC	4 (66.7)
Aspen	0 (0.0)
Pen-LUNG	0 (0.0)
Other	2 (33.3)

* Respondents could select multiple responses

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