Lung Cancer Screening Rates and Predictors of Screening in Rural and Urban Primary Care Facilities in Parts of Kansas and Missouri

Leah Lambart,PhD,[1] MPH Edward Ellerbeck, MD,[1,2] MPH, Aaron Katz, PharmD, PhD, [1,2] Simon C. Lee, PhD, MPH, [1,2] Jianghua He, PhD, [1,2] Nicole Nollen, PhD[1,2]
[1]The University of Kansas Cancer Center, Kansas, [2]The University of Kansas Medical Center, Kansas

Introduction

High rates of lung cancer mortality could be reduced by improved rates of lung cancer screening (LCS). There is an urgent need to understand the factors associated with low LCS rates in primary care. Unlike other cancers where eligibility depends mostly on age which is available within the electronic health record (EHR), patient eligibility for LCS includes quantifying lifetime cigarette use by calculating pack years, recording quit dates and years since quit, and documentation of shared decision making (SDM). Despite efforts to increase screening in clinical settings, rates remain low at 4.5% in 2022.

Goals of the Project

1) To ascertain the adequacy of Electronic Health Record (EHR) documentation to support guideline-based LCS across a range of primary care practices in the Midwest, including documentation of: a) current smoking status; b) date quit (for former smokers); c) pack-years. 2) To assess practice-level variability in LCS rates.

Variable	Missing for Current Smoker n=3,200 (%)	Missing for Former Smoker n=3,687 (%)
Packs per day	2380 (74.4)	3687 (100.0)
Years smoked	3154 (98.6)	3642 (98.8)
Pack years	3175 (99.2)	3687 (100.0)
Years quit	3134 (97.9)	3616 (98.1)
Age	0 (0.0)	0 (0.0)

Table 1. *Impact of Missing Data for Current and Former Smokers on Identifying Patients in Final Analytic Cohort (n=6,887)*

Methods and Materials

Data were collected from EHR and claims from 1/1/2021 to 12/31/2022. Guideline-based eligible patients for LCS were identified. The proportion of eligible patients screened was calculated for 2021 and 2022 and the rate of re-screening in 2022 was calculated. Chi-squared tests were used to compare categorical variables.

Results

Smoking status was available for 40% of patients; other eligibility criteria were largely missing and in a difficult format, i.e. no discrete variables, see Table 1. The individual screening rates were 4.1% for 2021 and 4.2% for 2022. The re-screen rate for 2022 1.7%. The facility screening rates varied from 0.0-9.2% for 2021 and 0.0-14.9% in 2022. See Table 2 for Relationship between Smoking Status, Age and LCS and Table 3 for Relationship between RUCA Codes and LCS.

2021	Total	Screened n (%)	Risk Ratio (95% CI)	p-value
Smoking Status				
Current Smoker	3200	209 (6.5)	Ref	
Former Smoker	3687	73 (2.0)	0.30 (0.23, 0.39)	<.0001
Age Categories				
Age: 50 – 54	767	11 (1.4)	Ref	
Age: 55 – 64	2320	92 (4.0)	2.77 (1.49, 5.14)	0.00
Age: 65 – 70	1741	105 (6.0)	4.21 (2.27, 7.78)	<.0001
Age: 71+	2059	74 (3.6)	2.51 (1.34, 4.70)	0.
2022	**Total**	**Scanned n (%)**	**Risk Ratio (95% CI)**	**p-value**
Smoking Status				
Current Smoker	3200	219 (6.8)	Ref	
Former Smoker	3687	68 (1.8)	0.27 (0.21, 0.35)	<.0001
Age Categories				
Age: 50 – 54	767	19 (2.5)	Ref	
Age: 55 – 64	2320	92 (4.0)	1.60 (0.98, 2.61)	0.06
Age: 65 – 70	1741	102 (5.9)	2.3651 (1.46, 3.83)	0.00
Age: 71+	2059	74 (3.6)	1.45 (0.88, 2.39)	0.14

Table 2. *Relationship between Smoking Status, Age, and LCS*

Discussion

Strikingly, 60% of patients did not have smoking status recorded and over 97% of key variables used for LCS eligibility were missing. The rate of missing data, by criterion, does not support proper identification of individuals who are eligible for LCS.

Conclusions

The biggest challenge to LCS uncovered here was EHR data quality for patient identification. Providers do not have the right systems in place to even identify LCS eligible and, as a result, LCS screen and re-screen rates are low.

2021	Total	Screened n (%)	Risk Ratio (95% CI)	p-value
RUCA Groups				
RUCA 1-3	4924	228 (4.6)	Ref	
RUCA 4-7	973	9 (0.9)	0.20 (0.10, 0.39)	<.0001
RUCA 8-10	990	45 (4.5)	0.98 (0.72, 1.34)	0.91
Missing	0	0 (0.0)		
RUCA Urban/Rural				
Urban, RUCA =1-3	4973	228 (4.6)	Ref	
Rural, RUCA = 4-10	1914	54 (2.8)	0.59 (0.44, 0.80)	0.00
Missing	0	0 (0.0)		
2022	**Total**	**Scanned n (%)**	**Risk Ratio (95% CI)**	**p-value**
RUCA Groups				
RUCA 1-3	4924	224 (4.5)	Ref	
RUCA 4-7	973	10 (1.0)	0.23 (0.12, 0.42)	<.0001
RUCA 8-10	990	53 (5.4)	1.18 (0.88, 1.58)	0.27
Missing	0	0 (0.0)		
RUCA Urban/Rural				
Urban, RUCA =1-3	4973	224 (4.5)	Ref	
Rural, RUCA = 4-10	1914	63 (3.3)	0.71 (0.54, 0.93)	0.01
Missing	0	0 (0.0)		

Table 3. *Relationship between RUCA Codes and LCS*