Racial Disparities in Lung Cancer Screening: An Exploratory Investigation

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Abstract: Background/Purpose: Lung cancer is the leading cause of cancer death in the United States. Black Americans have the highest rate of lung cancer mortality, due to being diagnosed at later stage. Lung Cancer Screening (LCS) facilitates earlier detection and has been associated with a reduction in cancer death. We investigated LCS utilization and explored racial disparities (Black vs. non-Black) in LCS among patients for whom LCS is clinically indicated.

Methods: Using electronic medical records from the Lifespan Medical System, we randomly selected 200 patients who were likely to meet U. S. Preventive Services Taskforce (USPSTF) guidelines for LCS and mailed each patient a survey to assess LCS eligibility and uptake.

Results: Nearly three-quarters (n = 146, 73%) completed the survey and, of survey respondents, 92% (n = 134) were eligible for the study. Among eligible patients, 35% met criteria for LCS; non-Black patients were 90% more likely to meet criteria for LCS than Black patients (44% vs. 27%). Of the patients meeting USPSTF criteria, only 21% reported being screened; eligible non-Black patients were 2.8 times more likely to have had LCS than eligible Black patients (30% vs. 12%).

Conclusions: LCS utilization is low despite coverage provided through the Affordable Care Act. Black patients are less likely to qualify for screening and disproportionately less likely to be screened for lung cancer compared with non-Black patients. Targeted intervention strategies are needed to increase referral for and uptake of LCS in patients who are at high risk for developing lung cancer, and for Black patients in particular.

Abbreviations: NLST, National Lung Screening Trial; LDCT, low dose CAT scan; USPSTF, United States Preventive Services Task Force; ACA, Affordable Care Act; LCS, lung cancer screening; AOR, adjusted odds ratio

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INTRODUCTION

Lung cancer is the leading cause of cancer death in the United States, accounting for 13% of new cancer diagnoses and 27% of cancer deaths.[1] The disproportionate rate of cancer-related death is attributable to the majority (57%) of diagnoses made in late stage.[1] The National Lung Screening Trial (NLST) found that annual screening of long-term current and former smokers with low dose computerized tomography (LDCT) resulted in a 20% reduction in cancer deaths.[2] This reduction was attributed to diagnosis at earlier stage when treatment is curative. The United States Preventative Services Task Force (USPSTF) recommends annual lung cancer screening (LCS) with LDCT for current and recent (quit < 15 years) former smokers, aged 55−80 years, with a 30 pack year smoking history.

LCS has been underutilized. In 2011, 21% of current or former smokers over age 55 reported being screened.[3] In 2015, the Affordable Care Act (ACA) began requiring coverage of LCS for those meeting USPSTF criteria. Research is needed to evaluate whether the ACA has improved rates of guideline-consistent LCS.

Black smokers should be screened for lung cancer, but, due to lower tobacco exposure,[4] they are less likely to meet screening criteria. Black men have the highest rates of lung cancer, Black patients are diagnosed at later stage, and lung cancer is more fatal in Black men.[1] Health disparities in survival may be compounded by USPSTF criteria for LCS, which are largely based on tobacco exposure.

In the current exploratory study, we investigated USPSTF LCS eligibility and LCS utilization among Black and non-Black patients of an academic medical system. We hypothesized that (1) LCS utilization would be low, and (2) LCS eligibility and utilization would be disproportionately lower for Black patients.

MATERIALS AND METHODS

Participants

Potential participants (n = 200) were randomly selected from the electronic medical record for a healthcare organization in Rhode Island. Black patients were oversampled, comprising 50% of the sample. Inclusion criteria were: current or former smoker, aged 55−80. Exclusion criteria were: history of lung cancer or cognitive impairment, deceased, and non-English speaking.

Procedures

Procedures were approved by the Institutional Review Board. In September, 2016, participants were mailed a study packet including: a cover letter; a fact sheet that detailed the purpose of the research, assured confidentiality, emphasized voluntary participation, estimated survey

completion time, emphasized interest in group data, and described risks and benefits of participation; a brief survey; an opt-out letter, opting out of study participation; a self-addressed, stamped envelope; and $10 payment. Participants were told to keep the $10, regardless of participation. Non-respondents were mailed a second packet one week later. Non-respondents were called a week later to complete the survey by telephone.

Measures

Eligibility for LCS.

(i) *Current or former smoker* was measured with two items, "Have you smoked at least 100 cigarettes in your entire life?" and "Do you now smoke cigarettes every day, some days or not at all?"[5]

(ii) *≥ 30 pack years.* Participants were asked, "How old were you when you first started smoking regularly?"[5] Current smokers were asked, "During the past 30 days, on the days that you smoked, how many cigarettes did you smoke per day?" to obtain cigarettes smoked per day.[5] For current smokers, age at which she or he smoked regularly was subtracted from current age to obtain number of years smoked. This was multiplied by the number of cigarettes per day to obtain pack years.

(iii) *Quit <15 years.* Former smokers were asked, "How long has it been since you quit using cigarettes?"[5] This was subtracted from the age at which she or he started smoking to obtain number of years smoked. The number of years smoked was multiplied by the number of cigarettes per day prior to quitting, "At that time, how many cigarettes did you usually smoke per day?"[5] to obtain pack years.

(iv) *No current or suspected diagnosis of lung cancer.* Participants were asked, "Were you ever told you have lung cancer?"

Lung cancer screening uptake. Participants were asked, "Have you ever had a CT scan to detect lung cancer?

(A CT or "cat" scan is similar to an x-ray, except that for this test you lie on a table that slides into a tunnel that takes a picture of the lungs. If something abnormal is found, it usually results in follow-up tests or surgery.)"[3]

Data analysis

We compared Black and non-Black respondents on demographic criteria using Chi-squared tests for categorical variables and one-way analyses of variance for continuous variables. We used logistic regression to obtain effect size estimates (adjusted odds ratio; AOR) of comparisons between Black and non-Black respondents (reference group = Black) on LCS eligibility and utilization, controlling for age.

RESULTS AND DISCUSSION

Survey response

Of 200 potential participants, 143 returned the survey (10 opted out, 1 deceased, 43 unreachable, 3 returned to sender; response rate = 73%; 70 Black, 73 non-Black). Patients who reported never smoking regularly were excluded from analyses ($n = 9$; analytical sample $n = 134$ participants).

Sample characteristics

As displayed in Table 1, 52% of participants were female; mean age was 64.4 ($SD = 8.5$). Forty-nine percent were of Black race, 50% White, and 1% Other; 27% were daily smokers, 9% non-daily smokers, and 64% former smokers. Average pack years was 26.8 ($SD = 24.0$). The only racial difference in demographics or smoking history was that Black respondents were younger (M age = 62.4, $SD = 6.8$) than non-Black participants (M age = 66.4, SD = 7.6; F (1,132) = 10.8, $p < 0.001$). In subsequent analyses, we control for age and report AORs.

LCS eligibility

Overall, 35% of the sample met USPSTF criteria for LCS. Non-Black patients were 90% more likely to meet criteria (non-Black: 44%, Black: 27%; AOR = 1.9, 95% CI 0.8, 4.0; Figure 1). Reasons for ineligibility included not meeting the pack year criterion (non-Black: 49%, Black: 68%; AOR = 0.5, 95% CI 0.2, 1.1) and/or having quit more than 15 years ago (non-Black: 62%, Black: 46%; AOR = 1.8, 95% CI 0.7, 4.5).

Rates of eligibility for LCS corroborate the observation that Black patients are less likely to be eligible due to lower smoke exposure.[4] Recommendations for LCS were based on the eligibility criteria for the NLST.[2] Study criteria were selected to capture a very high risk group in order to include enough individuals with a diagnosis of lung cancer to be able to validate the screening instrument. These criteria were not developed to select individuals most likely to benefit from the screening test. Research suggests using risk-profile algorithms would better select individuals likely to benefit from LCS, particularly among Black smokers.[6] In contrast, the use of criteria that systematically under-select Black smokers for potential life-saving screening may perpetuate disparities in lung cancer mortality.[7]