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Patients' age and discussion with doctors about lung cancer screening: Diminished returns of Blacks

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Abstract

Objective: As age is one of the main risk factors for lung cancer, older adults are expected to receive more messages regarding lung cancer screening (LCS). It is, however, unclear whether age similarly increases patients' chance of discussing LCS across various racial groups. We aimed to determine racial differences in the effect of patients' age on patient-physician discussion about LCS.

Methods: This cross-sectional study borrowed data from the Health Information National Trends Survey 5 (HINTS 2017), which included 2277 adults. Patients' demographic factors, socioeconomic characteristics, smoking status, possible LCS indication, and patient-physician discussion about LCS were measured. We ran logistic regression models for data analysis.

Results: Independent of possible LCS indication, older patients were more likely to have a patient-physician discussion about LCS. However, there was a significant interaction between race and age, suggesting a larger effect of age on the likelihood of discussing LCS with doctors for Whites than Blacks. In race-stratified models that controlled for possible LCS indication, higher age increased lung cancer discussion for Whites but not for Blacks.

Conclusion: Whether age increases the chance of discussing LCS or not depends on the patient's race, with Blacks receiving fewer messages regarding LCS as a result of their aging.

KEYWORDS

age, ethnicity, health communication message, Health Information National Trends Survey 5, lung cancer screening, race

1 | INTRODUCTION

Age is one of the strongest and most frequently studied risk factors for cancer incidence and mortality.[1,2] Since prevalence and incidence of most types of cancers increase with age, cancer is being considered an age-related disease.[3] Considering the aging of the US population, assessment of the link between old age and cancer diagnosis is more important than ever.[4] The incidence of lung cancer, the leading cause of cancer death in the United States, with an estimated 154 050 cancer-related deaths in 2018,[5] increases markedly with age.[6]

A large randomized clinical trial that included more than 50 000 participants (National Lung Screening Trial) showed a 20% decrease in lung cancer death using annual low-dose chest computed

tomography screening.[7] Following this large clinical trial, multiple cancer-related organizations, including the American College of Chest Physicians, the US Preventive Services Task Force, and the American College of Radiology, issued their recommendations for lung cancer screening (LCS) of high-risk individuals using low-dose computed tomography imaging.[8,9] Finally, in February 2015, the Center for Medicare and Medicaid Services (CMS) approved coverage for LCS of high-risk beneficiaries using low-dose computed tomography.[10] Considering the importance of age and smoking as two major risk factors of lung cancer, CMS defined eligible high-risk beneficiaries as individuals aged 55-77 years who have a smoking history of at least 30 pack-years and currently smoke or have quit within the past 15 years.[10]

Although age is supposed to increase the likelihood of a patient-doctor conversation about LCS, several other factors may prevent these discussions from occurring. From the patient side, older age is also associated with risk of poverty,[11] abuse, neglect,[12] cognitive decline,[13] memory loss,[13] social isolation,[14] and transportation difficulties,[15] all of which may reduce the chance for receiving an LCS discussion. On top of these factors, research has shown that despite higher risk of lung cancer, older individuals may discount such risk. In a recent study on a nationally representative sample of US adults, regardless of lung cancer risk, older age (despite increasing the actual risk of cancer) was associated with less cancer perceived risk and worries.[16]

Given that race influences quality of health care, the effect of patients' age on the opportunity to discuss LCS with physicians may be different for racial and ethnic groups.[17] Race is a major determinant of cancer mortality.[18] Despite their higher risk and mortality of lung cancer,[19] Black individuals are less likely than White individuals to perceive high levels of cancer risk.[16,20] In data collected from National Lung Screening Trial participants, Whites had higher cancer perceived risk than Blacks.[21] In addition, Blacks are less likely to qualify for LCS, despite coverage provided through the Affordable Care Act.[22] Some studies have documented racial disparities in LCS participation, with Blacks having a lower chance to receive LCS than Whites.[23] All these factors, in addition to high rate of poverty,[24] low trust toward the health-care system,[25,26] and low quality of care that they receive,[27] contribute to a relative disadvantage of Blacks compared to Whites regarding lung cancer outcomes.[18]

To better understand the reasons behind racial disparities in LCS, we compared Black and White patients for the association between age and having a discussion with a doctor about LCS. To generate generalizable results, we used data with a nationally representative sample of US adults.

2 | METHODS

2.1 | Design and setting

This was a cross-sectional study that used data from the Health Information National Trends Survey 5 (HINTS-5) Cycle 1, 2017.[28] The HINTS is a US nationally representative survey that has been periodically administered by the National Cancer Institute since 2003. The purpose of the HINTS is to provide data for researchers to better depict the national picture of cancer information among US adults.[29] The data collection period for the HINTS-5-Cycle 1 was January 2017 through May 2017.

2.2 | Ethics

The Westat's Institutional Review Board (IRB) approved the HINTS-5 study. Westat's Federal Wide Assurance (FWA) number is FWA00005551 and Westat's IRB number is 00000695. This project used to have an OMB number (0920-0589). The HINTS study was exempted from IRB review by the National Institutes of Health Office of Human Subjects. All HINTS-5 participants provided informed consent.

2.3 | Sampling

Non-institutionalized US adults (aged ≥18 years) living in the United States are the HINTS target population. The HINTS-5, Cycle 1 used a two-step sampling design to make sure that the final sample was nationally representative. The first step was a stratified sample of residential addresses that were derived from all residential addresses received from the Marketing Systems Group. In the second step, one adult from each household was selected to participate in this study. The sampling frame was grouped into two strata based on concentration of minorities: Stratum # 1, areas with high minority concentration; and Stratum # 2, areas with low minority concentration. Addresses were drawn from each sampling stratum using equal-probability sampling.[29]

2.4 | Survey information

The surveys were mailed to the targeted participants. To encourage study participation, a monetary incentive was included in the mail. Two toll-free telephone numbers (for English calls and Spanish calls) were provided to respondents. The overall response rate in HINTS-5 was 32.4%.[29]

2.5 | Study variables

The study variables used for analysis included patient's age, race, gender, education attainment, smoking status, health insurance status, and LCS discussion with doctor.

2.5.1 | Demographic factors

Demographic factors included in analysis were race, ethnicity, age, and gender. Race was considered as a dichotomous variable (0 = White, 1 = Black). Gender was also a dichotomous variable (0 = female, 1 = male). Patients' age was considered a continuous measure (range: 18-101 years).

TABLE 1 Patients' descriptive statistics in the pooled sample

	All (n = 2277)	
	% (SE)	95% CI
Race		
White	86.66 (0.01)	85.48-87.85
Black	13.34 (0.01)	12.15-14.52
Gender		
Men	47.89 (0.01)	46.57-49.21
Women	52.11 (0.01)	5.79-53.43
Any health insurance		
No	7.87 (0.01)	6.40-9.35
Yes	92.13 (0.01)	9.65-93.60
	Mean (SE)	95% CI
Age (years)	48.88 (0.34)	48.19-49.56
Education attainment	3.12 (0.02)	3.08-3.16

CI, confidence interval; SE, standard error. Source: Health Information National Trends Survey 5 (HINTS-5), 2017.[28]

2.5.2 | Smoking status

Ever smoker status was measured using the following survey question: "Have you smoked at least 100 cigarettes in your entire life?" with *yes* or *no* as response options. Patients were also asked this question regarding their smoking habit: "How often do you now smoke cigarettes?" with response options of: 1 = *Every day*, 2 = *Some days*, and 3 = *Not at all*. Current smoker status was assessed by being an ever smoker and admitting to smoking *every day* or *some days*.

2.5.3 | Health insurance

Having the following types of insurance was considered as being insured: (a) insurance purchased directly from an insurance company, (b) Medicare, for people aged 65 years and older, or people with certain disabilities, (c) Medicaid, Medical Assistance, or any kind of government-assistance plan, (d) TRICARE or other military health care, (e) Veterans Affairs, (f) Indian Health Service, and (g) any other type of health insurance or health coverage plan. Insurance status was treated as a dichotomous variable (0 = without insurance, 1 = with insurance).

2.5.4 | Possible LCS indication

Age 55-77 years and ever smoking status were used to divide study participants into the high- and low-risk for lung cancer groups: The high-risk group included those aged 55-77 years who were ever smokers. The low-risk group included any other participants. This grouping was based on CMS recommendations for LCS of high-risk individuals.[30] Pack-year smoking history was not documented in the HINTS data set. Therefore, we could not adjust our study cohort based on pack-year smoking.

2.5.5 | Having a discussion with doctors about LCS

The following single item was used to measure having had a discussion with doctors about LCS: "At any time in the past year, have you talked with your doctor or other health professional about having a test to check for lung cancer?" Responses were *yes*, *no*, and *do not know*.

2.6 | Statistical analysis

We used Stata 15.0 (Stata Corp.) for data analyses. For univariate analysis, we reported means and frequencies, associated with their standard errors (SEs) and 95% confidence intervals (CIs). To test the association between age and having a discussion with doctors about LCS, we used logistic regression models, controlling for demographic factors, education, and health-care access (insurance). We ran four models overall. Model 1 only included the main effects. Model 2 also included a race-by-age interaction term. Model 3 was performed in Whites. Model 4 was tested in Blacks. Odds ratio (OR), SE, 95% CI, *t*, and *P* values were reported. $P < 0.05$ was considered significant.

3 | RESULTS

3.1 | Descriptive statistics

Participants had a mean age of 49 years (SE = 0.34). From all participants, 52% were females. Thirteen percent of the sample was Black. Most participants (about 92%) had some type of health insurance. Table 1 summarizes the descriptive statistics for the pooled sample.

3.2 | Association between age and LCS discussion in the pooled sample

Based on Model 1, in the pooled sample of 2277 individuals, independent of possible LCS indication, higher age was associated with a higher chance of having had a discussion with a doctor about LCS (OR, 1.05; 95% CI, 1.02-1.07). Another factor significantly associated with having had a discussion with a doctor about LCS was being a current smoker (OR, 1.93; 95% CI, 1.17-3.18). We also found a marginally significant association between male gender and having a discussion with a doctor about LCS ($P = 0.053$; Table 2).

Based on Model 2, age showed a negative and significant interaction with race (OR, 0.95; 95% CI, 0.91-1.00), suggesting that age has a smaller association with chance of having had a discussion with doctors about LCS for Blacks compared to Whites (Table 2).

3.3 | Association between age and LCS discussion according to patient's race

As shown by Model 3, in Whites, independent of possible LCS indication, older age was associated with a higher chance of having had a discussion with a doctor about LCS (OR, 1.05; 95% CI, 1.03-1.08; Table 3).

TABLE 2 Results of logistic regression models in the pooled sample (n = 2277)

	OR (SE)	95% CI	*t*	*P*
Model 1				
Possible lung cancer screening indication	2.20 (0.65)	1.22-3.98	2.68	0.010
Age	1.05 (0.01)	1.02-1.07	4.19	0.000
Men	1.74 (0.48)	0.99-3.03	1.99	0.053
Current smoker	1.93 (0.48)	1.17-3.18	2.63	0.011
Any health insurance	1.10 (1.19)	0.13-9.62	0.09	0.932
Education attainment	0.82 (0.11)	0.63-1.08	−1.46	0.151
Race (Black)	1.29 (0.52)	0.57-2.91	0.63	0.532
Intercept	0.00 (0.00)	0.00-0.02	−5.59	0.000
Model 2				
Possible lung cancer screening indication	2.25 (0.68)	1.23-4.13	2.70	0.009
Age	1.05 (0.01)	1.03-1.08	4.13	0.000
Men	1.78 (0.49)	1.02-3.09	2.08	0.043
Current smoker	2.00 (0.50)	1.22-3.29	2.81	0.007
Any health insurance	1.07 (1.16)	0.12-9.43	0.06	0.949
Education attainment	0.81 (0.11)	0.62-1.05	−1.64	0.107
Race (Black)	19.14 (25.66)	1.29-283.19	2.20	0.032
Age × Race (Black)	0.95 (0.02)	0.91-1.00	−2.14	0.037
Intercept	0.00 (0.00)	0.00-0.02	−5.34	0.000

CI, confidence interval; OR, odds ratio; SE, standard error. Source: Health Information National Trends Survey 5 (HINTS-5), 2017.[28]

TABLE 3 Results of logistic regression models by race

	OR (SE)	95% CI	*t*	*P*
Model 3 (Whites)				
Possible lung cancer screening indication	2.24 (0.65)	1.26-4.00	2.80	0.007
Age	1.05 (0.01)	1.03-1.08	4.12	0.000
Male	1.73 (0.49)	0.98-3.07	1.94	0.058
Current smoker	1.82 (0.56)	0.98-3.37	1.95	0.057
Any health insurance	1.48 (0.65)	0.61-3.58	0.89	0.377
Education attainment	0.84 (0.09)	0.67-1.05	−1.59	0.118
Intercept	0.00 (0.00)	0.00-0.01	−7.19	0.000
Model 4 (Blacks)				
Possible lung cancer screening indication	1.84 (2.58)	0.11-3.88	0.43	0.666
Age	1.00 (0.04)	0.93-1.08	0.03	0.973
Gender (Male)	1.87 (1.42)	0.41-8.62	0.83	0.412
Smoking status (Current smoker)	3.83 (3.13)	0.74-19.79	1.64	0.107
Any health insurance	0.40 (0.38)	0.06-2.74	−0.96	0.341
Education attainment	0.65 (0.24)	0.31-1.37	−1.17	0.247
Intercept	0.16 (0.25)	0.01-3.99	−1.15	0.256

CI, confidence interval; OR, odds ratio; SE, standard error. Source: Health Information National Trends Survey 5 (HINTS-5), 2017.[28]

As shown by Model 4, in Blacks, however, age was not associated with having had a discussion with a doctor about LCS (OR, 1.00; 95% CI, 0.93-1.08; Table 3).

4 | DISCUSSION

We found that a patient's age was positively associated with having had a discussion with a physician about LCS in the whole population. The effect of patient's age on patient-physician discussion about LCS, however, was present for White but not Black patients. There was also an interaction between race and patient's age.

These findings suggest two main hypotheses: First, Black patients' age more strongly increases barriers to a high-quality conversation with a doctor, compared to White patients (through various mechanisms, such as cognitive decline, health literacy, stigma, fear, and poverty); and second, age more strongly correlates with the biases of health-care providers for Black than White patients. Particular sections of society—minority populations with low socioeconomic status— suffer from greater adversities and highest-level biases from the health-care system. This tendency might be explained as "multilevel adversities against cancer screening."

Several subjective or objective factors may operate as potential barriers for patient-physician conversations. While the patient's age may increase some of these psychosocial barriers, this effect may differ according to the patient's race. Black individuals, on average, have lower health literacy compared to Whites.[31] Low cancer literacy might play a role in lowering the chance of an LCS discussion with physicians for Black patients.[22] Black individuals also have lower perceived risk and worries of cancer despite a higher actual risk for lung cancer.[16] Blacks tend to be younger but at a higher stage of lung cancer at the time of lung cancer diagnosis.[24,32] Lower perceived risk of cancer and cancer worries may prevent Blacks from searching for available LCS options and decrease their engagement in LCS discussion with their physicians. Higher rates of poverty in Blacks also contribute to the existing racial disparities in lung cancer outcomes.[24] The poverty rate increases with age and is higher in Blacks as compared to Whites.[33] If Black older adults more frequently struggle with poverty, ageing may be a strong barrier for them against the chance of having a patient-physician discussion about LCS. Racial difference in the level of trust in the health-care system is another factor that may cause a relative disadvantage for Black older individuals regarding patient-physician interaction.[26] These racial differences suggest that age may have a larger effect as a barrier against chance of LCS discussion for Blacks as compared to Whites.

Biases of the health-care system, which are associated with worse health outcomes, may also differently impact Black and White older adults.[34,35] Physician bias becomes a more significant problem when the physician and patient are not from one race.[36] Blacks are less likely to be race concordant with their physicians compared to Whites.[37] It has been shown that lack of patient-physician racial concordance reduces quality of doctor-patient engagement for Black patients.[38] Black patients also report lower satisfaction from their health-care visits compared to White patients.[25] It has been shown that Black lung cancer patients are less likely than White lung cancer patients to receive a recommendation for lung cancer surgery.[39]

Physician implicit racial bias against Black patients is widely documented in the United States.[27,40] White physicians with high implicit racial bias against Blacks may have worse interaction with their Black patients.[41] Implicit and explicit biases of the health-care system against Blacks can specifically reduce quality of patient-physician interactions and chance of LCS discussion for Black patients.[42]

Lack of the effect of patients' age on chance of LCS discussion with physician for Blacks can also be explained by the minorities' diminished returns theory,[43,44] which suggests that effects of resources and risk factors are smaller for Blacks compared to Whites.[45,46] This theory suggests that it is not just differential distribution of risk and protective factors but also their variable effects that are responsible for racial and ethnic health disparities in the United States. In this view, Whites' outcomes are more closely a function of their risk and protective factors; however, for racial and ethnic groups, such as Blacks[45] and Hispanics,[46] risk/protective factors and outcomes are more likely to be disjointed. Similarly, age has shown differential health correlates for White and Black people.[47] For many reasons, including racism and discrimination,[48] economic processes,[19,33–35,49–51] and bias in the health-care system,[17] socioeconomic factors have larger effects on health behaviors, such as diet,[52] sleep,[53] exercise,[53] smoking,[54] drinking,[55] obesity,[56] and depression,[57] for Whites than Blacks. We argue that in a similar pattern, White patients may get a higher chance of LCS discussion with their physicians as they get older; however, for Blacks, aging fails to increase Black patients' chance of discussing LCS with their doctor.

This study had a few limitations. LCS participation rate was not assessed in this study. LCS participation is not included in the HINTS and is beyond the scope of our analysis. Lack of pack-year smoking measurement in the HINTS prevents us from generating the exact high-risk population for lung cancer based on the CMS guideline. However, we included all individuals aged 55-77 years with history of smoking based on the CMS guideline. HINTS data have been used for assessment of high-risk for lung cancer individuals.[16] Considering that most smokers initiate smoking prior to age 26 and that mean age was 49 years in our cohort, it is extremely probable that most of the smokers we included in our analysis were long-term smokers.[58] Among the limitations of our study is the cross-sectional nature of our data. However, large sample size, and using a national representative sample, was among the strengths of this study.

5 | CONCLUSION

We found that, unlike Whites, Blacks are not receiving more LCS messages from their physicians as they get older. This finding is in line with the minorities' diminished returns theory, suggesting that the effects of risk and protective factors are systematically smaller

for the minority group. The finding is also alarming and may contribute to the racial disparities in LCS. As such, clinicians, health-care educators, and policy-makers should be aware of multiple causes of racial disparities in LCS.

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CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

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