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Evaluation of Telemedicine Use Among US Patients With Newly Diagnosed Cancer by Socioeconomic Status

The COVID-19 pandemic led to a decline of in-person clinical visits.[1] Telemedicine increased during this time, but there was lower uptake in high-poverty areas.[2] For patients newly diagnosed with cancer, a delay in care could cause irreversible harm; therefore these patients may be especially motivated to use telemedicine to keep health care appointments during the pandemic. The present study uses data from a large commercial insurer to examine the uptake of telemedicine visits among patients with newly diagnosed cancer, with a specific focus on assessing differential uptake by socioeconomic status (SES).

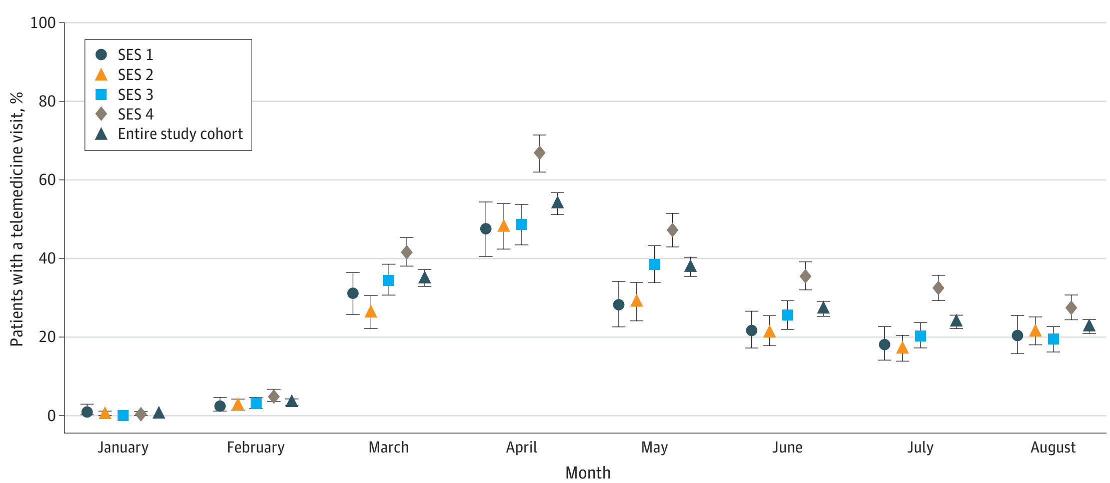
Supplemental content

Methods | The HealthCore Integrated Research Database comprises single-payer administrative claims data for approximately 60 million individuals enrolled in Medicare Advantage and commercial health plans.[3] Data on race and ethnicity were not available in the claims data set used in this analysis. The University of Kansas Institutional Review Board deemed this study exempt from review and patient informed consent requirements because only deidentified claims data were used.

Using the claims data, we identified patients with newly diagnosed breast (women only), lung, prostate, and colorectal cancer between January 1 and August 31, 2020. For each month, we first identified enrollees aged 18 years or older with at least 2 years of continuous enrollment prior to the first date of the month of interest (index month) and no medical claims with *International Statistical Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM)* diagnosis or personal history codes for the cancer of interest during the 2 years preceding the index month (1 year for lung cancer because of its more aggressive nature and the lower likelihood of including prevalent cases with a 1 year look-back period). Enrollees meeting these criteria were evaluated for newly diagnosed cancer, defined as the presence of 1 or more medical claims with an *ICD-10-CM* diagnosis code for the cancer of interest (eTable in the Supplement), during the index month.

The primary outcome was receipt of a telemedicine visit within 30 days of cancer diagnosis, which was ascertained by the presence of 1 or more claims with *Current Procedural Terminology* or Healthcare Common Procedure Coding Systems codes for telemedicine services (eTable in the Supplement). The monthly proportion of patients who received such services was computed along with a Wilson score 95% CI. The SES index score was calculated using 7 area-level social determinants of health variables, as developed by the Agency for Healthcare Research and Quality,[4] and analyzed as quartiles. Multivariable Poisson regression models were used to assess the association between SES index quartile and telemedicine visit, while controlling for age group, geographic region, cancer type, and Charlson Comorbidity Index score. All analyses were conducted using SAS, version 9.4 (SAS Institute) and Excel, version 16.0 (Microsoft Corporation).

Figure. Monthly Proportion of Patients With a Telemedicine Visit Within 30 Days of Cancer Diagnosis by Socioeconomic Status Quartile in 2020



The lowest socioeconomic status (SES) quartile is SES 1, and SES 4 is the highest quartile. Error bars represent the 95% Wilson score CIs for the proportions.

Table. Multivariable-Adjusted Relative Difference in Proportions of Patients Who Had a Telemedicine Visit Within 30 Days of Cancer Diagnosis in 2020

Variable	Risk Ratio (95% CI)
SES index quartile	
1 (lowest)	[Reference]
2	0.94 (0.83-1.07)
3	1.06 (0.94-1.19)
4 (highest)	1.31 (1.17-1.47)
Age group, y	
18-64	[Reference]
≥65	0.89 (0.83-0.95)
Cancer type	
Breast	[Reference]
Colorectal	0.96 (0.86-1.07)
Lung	1.24 (1.13-1.37)
Prostate	1.01 (0.92-1.10)
Charlson Comorbidity Index score	
0	[Reference]
1	1.05 (0.95-1.16)
2	1.04 (0.92-1.16)
≥3	1.26 (1.15-1.38)
Region	
Northeast	[Reference]
Midwest	0.74 (0.66-0.82)
South	0.72 (0.64-0.80)
West	1.13 (1.02-1.25)

Abbreviation: SES, socioeconomic status.

Results | Among 16 006 newly diagnosed patients (8483 were men [53%] and 7523 were women [47%]; 8115 [50.7%] were aged 18-64 years and 7891 [49.3%] were aged ≥65 years), the rate of telemedicine visits increased from 0.4% in January 2020 and peaked in April 2020 (54.0%), and patterns of uptake differed by SES (**Figure**). By April 2020, 66.9% of patients in the highest SES index quartile had a telemedicine visit within 30 days of cancer diagnosis compared with 47.4% to 48.6% in the lower SES index quartiles. Patients in the highest SES index quartile (ie, quartile 4) maintained the highest rate of telemedicine use in every subsequent month. Multivariable analysis confirmed differences in telemedicine use by SES and showed differences by age group, cancer type, comorbidities, and geographic region (**Table**). For example, patients in the highest SES index quartile had a 31% higher risk of telemedicine use within 30 days of cancer diagnosis compared with patients in the lowest SES index quartile (risk ratio [RR] = 1.31; 95% CI, 1.17 to 1.47). Additional multivariable models confirmed statistically significant differences by SES each month from March to July 2020. For example, relative RRs comparing the use of telemedicine within 30 days of cancer diagnosis between patients in the highest SES index quartile vs those in the lowest SES index quartile were 1.29 (95% CI, 1.01 to 1.66) in March 2020 and 1.59 (95% CI, 1.18 to 2.15) in July 2020.

Discussion | Disparities in cancer care and the resulting outcomes have been well described before the COVID-19 pandemic. Development of telemedicine capabilities has the potential to reduce these disparities by increasing access to consultations, second opinions, and follow-up visits. Yet the findings of the present study suggest that development of telemedicine capabilities is insufficient to reduce and, in fact, may widen disparities. We acknowledge that this study is limited in that disparities in telemedicine use may be attributable to patient preferences for in-person vs telemedicine visits rather than disparities in oncologic care. Differences in telemedicine use may also be attributable to patient access to and comfort with the technological requirements of telemedicine.[5] Published studies have found that telemedicine can improve access to health care services, including specialized care, and can provide patient satisfaction comparable to in-person visits.[6] Future implementation of new care delivery methods must have equitable access at its core.

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Evaluating Eligibility of US Black Women Under USPSTF Lung Cancer Screening Guidelines

The 2021 US Preventive Services Task Force (USPSTF) lung cancer screening guidelines[1] have increased the number of smokers eligible for screening by lowering the age eligibility from 55 to 50 years and reducing the requisite pack-years of smoking from 30 to 20. While these changes should increase the proportion of Black individuals eligible for screening,[2] it is possible that many high-risk Black women will continue to be ineligible.[3,4] In this quality improvement study, we evaluate lung cancer screening eligibility among US Black women under the 2013 and 2021 USPSTF guidelines.

Methods | Participants of the Black Women's Health Study (BWHS), which includes self-identified Black women from across the US (n = 58 973), were enrolled in 1995 by completing a health questionnaire with detailed information on cigarette smoking and other exposures; information was updated by biennial questionnaires.[5] The study was approved by the Boston University Medical Campus Institutional Review Board. Incident lung cancers were identified by self-report and annual linkages with state cancer registries and the National Death Index. We evaluated the proportion of women diagnosed with lung cancer who would have been eligible under the 2013 vs 2021 USPSTF lung cancer screening guidelines. We also estimated the sensitivity and specificity of the USPSTF guidelines and alternative guidelines based on different criteria for pack-year smoking history and years since quitting (YSQ). Analyses were conducted using SAS, version 9.4 (SAS Institute).

Table 1. Reasons for Ineligibility Under 2013 and 2021 USPSTF Guidelines Among Black Women's Health Study Participants With Lung Cancer Who Were Current or Former Smokers

	2013 USPSTF guidelines	2021 USPSTF guidelines
Total cases ineligible for screening	367	314
Reason for ineligibility, No. (%)[a]		
Age <55 y (2013) or <50 y (2021)	94 (25.6)	50 (15.9)
Age >80 y	15 (4.1)	15 (4.8)
Pack-years <30 (2013) or <20 (2021)	283 (77.1)	213 (67.8)
Years since quitting >15	145 (39.5)	145 (46.4)

Abbreviation: USPSTF, US Preventive Services Task Force.

[a] Categories are not mutually exclusive.

Results | During follow-up of 58 973 BWHS participants from July 1995 through December 2017, 559 women were diagnosed with lung cancer, with mean (SD) age at diagnosis of 64.0 (10.9) years (median [IQR], 65.0 [57.0-72.0] years); 43% were current smokers, 42% were former smokers, and 15% were never smokers. Mean (SD) number of pack-years were 27.6 (15.7) (median [IQR], 18.3 [11.0-32.0]) and 23.0 (17.3) (median [IQR], 17.0 [11.0-32.0]) among current and former smokers, respectively; among former smokers, mean (SD) YSQ was 22.6 (16.6) years (median [IQR], 26.0 [8.0-38.0] years).

Under 2013 USPSTF guidelines, 22.7% of BWHS participants with lung cancer who had a smoking history would have been eligible for lung cancer screening. Under the new 2021 guidelines, the proportion of women eligible for screening increased to 33.9%, representing a 50% increase in eligibility (McNemar test, $P < .001$). Among the 314 smokers who would not have been eligible for screening under the 2021 guidelines, 67.8% were ineligible because they had fewer than 20 pack-years smoking history, and 46.2% were ineligible because they quit smoking more than 15 years ago (**Table 1**).

Sensitivity and specificity of the 2021 guidelines among the 21 604 BWHS participants who were ever smokers were 33.9% and 86.5%, respectively (**Table 2**). Removing the requirement that former smokers must have quit smoking within the past 15 years was associated with an increase in sensitivity, to 48.2%, and a decrease in specificity, to 78.9%. Reducing the required number of pack-years to 15 or 10 years was associated with further increased sensitivity and decreased specificity.

Discussion | In the present analysis, the proportion of Black women diagnosed with lung cancer who would have been

Table 2. Sensitivity and Specificity of Varying Guidelines for Lung Cancer Screening, Based on 22 079 Ever Smokers in the Black Women's Health Study

Possible guidelines	No. eligible among 475 women with lung cancer	Sensitivity, % (95% CI)	No. ineligible among 21 604 women without lung cancer	Specificity, % (95% CI)
2013 Guidelines: age 55-80 y and ≥30 pack-years and current smoker or quit <15 y ago	108	22.7 (18.9-26.5)	20 100	93.0 (92.7-93.3)
2021 Guidelines: age 50-80 y and ≥20 pack-years and current smoker or quit <15 y ago	161	33.9 (29.6-38.2)	18 697	86.5 (86.0-87.0)
≥20 Pack-years and age 50-80 y	229	48.2 (43.7-52.7)	17 050	78.9 (78.4-79.4)
≥15 Pack-years and age 50-80 y	294	61.9 (57.5-66.3)	14 964	69.3 (68.7-69.9)
≥10 Pack-years and age 50-80 y	348	73.3 (69.3-77.3)	12 330	57.1 (56.4-57.8)
≥15 Pack-years and age 50-80 y, and 15 y since quit	207	43.6 (39.1-48.1)	17 386	80.5 (80.0-81.0)
≥10 Pack-years and age 50-80 y, and 15 y since quit	243	51.2 (46.7-55.7)	16 008	74.1 (73.5-74.7)