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Examining the Role of Access to Care: Racial/Ethnic Differences in Receipt of Resection for Early-Stage Non-Small Cell Lung Cancer among Integrated System Members and Non-Members

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Abstract

Objectives: To examine the role of uniform access to care in reducing racial/ethnic disparities in receipt of resection for early stage non-small cell lung cancer (NSCLC) by comparing integrated health system member patients to demographically similar non-member patients.

Materials and Methods: Using data from the California Cancer Registry, we conducted a retrospective cohort study of patients from four racial/ethnic groups (White, Black, Hispanic, Asian/Pacific Islander), aged 21 to 80, with a first primary diagnosis of stage I or II NSCLC between 2004 and 2011, in counties served by Kaiser Permanente Northern California (KPNC) at diagnosis. Our cohort included 1,565 KPNC member and 4,221 non-member patients. To examine the relationship between race/ethnicity and receipt of surgery stratified by KPNC membership, we used modified Poisson regression to calculate risk ratios (RR) adjusted for patient demographic and tumor characteristics.

Results: Black patients were least likely to receive surgery regardless of access to integrated care (64–65% in both groups). The magnitude of the black-white difference in the likelihood of surgery receipt was similar for members (RR: 0.82, 95% CI: 0.73–0.93) and non-members (RR: 0.86, 95% CI: 0.80–0.94). Among members, roughly equal proportions of Hispanic and White patients

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received surgery; however, among non-members, Hispanic patients were less likely to receive surgery (non-members, RR: 0.93, 95% CI: 0.86–1.00; members, RR: 0.98, 95% CI: 0.89–1.08).

Conclusion: Disparities in surgical treatment for NSCLC were not reduced through integrated health system membership, suggesting that factors other than access to care (e.g., patient-provider communication) may underlie disparities. Future research should focus on identifying such modifiable factors.

Keywords

cancer care; access to care; disparities

1. Introduction

Patients diagnosed with early-stage (I-II) non-small cell lung cancer (NSCLC) who undergo surgery experience substantially better outcomes than those who do not. Five-year survival rates range from 60–80% for resected stage I disease and from 30–50% for resected stage II disease, compared to 15% for non-resected stage I and II disease.¹ A multitude of previous studies have concluded that black patients are less likely than white patients to receive surgery,^{2–9} likely contributing to documented disparities in NSCLC survival.² It is crucial to understand the current extent of, and factors underlying racial/ethnic differences in receipt of surgical treatment for early stage NSCLC, with the goal of informing strategies to improve the equity of care.

The pathway from lung tumor detection to surgery can be complex, requiring sequential coordination of multiple providers^{10–12} who may be distributed across systems. Previous research has suggested that disparities in receipt of recommended lung cancer treatment may result at least in part from racial differences in patients' ability to access specialty care services along this pathway. For example, black patients with NSCLC are less likely than white patients to be evaluated by a surgeon.¹³ This may be due in part to differences in where black and white patients receive their routine care, as primary care providers whose patient panels consist primarily of minorities report greater difficulties accessing high-quality specialty care for their patients.¹⁴

Patients who are members of integrated health care delivery systems experience more uniform access to local primary and specialty care services that are well-coordinated through the use of common information systems and referral networks.^{15,16} Prior research suggests that, as a result, in integrated systems, cancer care delivery may be more equitable.^{17–19} However, no studies have examined the role of uniform access to care in potentially reducing lung cancer treatment disparities by directly comparing racial/ethnic differences in initial treatment among members of an integrated health care delivery system to those among non-members. To address this gap, we analyzed data from the California Cancer Registry (CCR) on a contemporary and diverse cohort of patients diagnosed with early stage NSCLC. We hypothesized that racial/ethnic differences in the receipt of surgical resection would be minimized among members, compared to non-members, of an integrated health care system.

2. Methods

2.1 Study Setting and Population

Kaiser Permanente Northern California (KPNC) is a fully integrated health care delivery system currently serving approximately four million members at 21 medical centers across 23 counties in Northern California. The system serves a diverse membership largely representative of the insured population in Northern California, except at extremes of the socioeconomic spectrum.²⁰ As mandated by law, KPNC reports all verified cancers to the CCR and the U.S. Surveillance, Epidemiology, and End Results (SEER) Program. Following SEER Program standards, the KPNC Cancer Registry has captured data on all patients diagnosed or treated with any primary cancer, except non-melanoma skin cancer, at KPNC facilities since 1988.

Patients of known race/ethnicity with a first primary diagnosis of stage I or II NSCLC at ages 21 to 80 from 2004 to 2011 were identified from the KPNC Cancer Registry and the CCR. NSCLC was defined using the Surveillance, Epidemiology, and End Results (SEER) site code 22030, including morphology codes 8012–8040 and 8046–8576; histologic subgroups were defined as proposed by Lewis and colleagues.²¹ Tumor stage was based on the American Joint Commission on Cancer TNM Staging System, 6th edition, for the entire study period. Patients older than age 80 were excluded to minimize potential differences in treatment associated with age. Patients were also excluded if they were not classified as White, Black, Asian/Pacific Islander (API), or Hispanic; diagnosed at autopsy; or resided in a county not served by KPNC at NSCLC diagnosis.

KPNC member patients were distinguished from non-member patients according to whether they were first diagnosed with NSCLC at KPNC or elsewhere. Identification of KPNC member versus non-member patients who met study inclusion criteria involved probabilistic linkage of records from the KPNC Cancer Registry to the CCR using unique personal identifiers: first and last name, alias, gender, social security number, dates of birth and diagnosis, and residential address and zip code at diagnosis. This linkage process encompassed six blocking passes, by which all eligible patients identified from the KPNC Cancer Registry were matched to CCR records with high confidence. The November 2014 extract of the CCR was used, with patient follow-up data complete through 2012.

Institutional review boards of both KPNC and the California State Committee for the Protection of Human Subjects approved conduct of this study under a waiver of informed consent.

2.2 Data Sources and Variables

All data on demographic and clinical characteristics, including an area-level measure of socioeconomic status (SES),²² along with initial treatment (up to six months post-diagnosis) for KPNC members and non-members were ascertained from the CCR. The outcome of interest was receipt of surgery for lung cancer. The main independent variable in our analyses was race/ethnicity, as reported in patients' medical records and abstracted for the CCR (White, Black, Hispanic, or API). Race/ethnic categories were mutually exclusive.

2.3 Statistical Analysis

Summary statistics for patient characteristics were tabulated separately by KPNC membership status. Given that all variables were categorical, percent distributions were calculated for each group and compared using the Pearson chi-square test. We used modified Poisson regression with robust standard errors²³ to assess the relationship between race/ethnicity and receipt of surgical resection, stratified by KPNC membership. Risk ratios (RRs) and 95% confidence intervals (CIs) were estimated adjusting for potential confounders, including patient demographic (gender, age, marital status, area-level socioeconomic status) and tumor characteristics (stage, size, histologic subtype). All analyses were conducted using SAS 9.3 (Cary, NC).

To assess the potential impact of differential death or loss to follow-up on our results, we calculated the proportions of patients in each racial group who died or were lost within one month and six months of NSCLC diagnosis, among KPNC members and non-members separately. In sensitivity analyses, we excluded patients who died or were lost within one month (n=5 KPNC members, 74 non-members) and within six months (n=94 KPNC members, 395 non-members) of diagnosis from our multivariate models. Additional sensitivity analyses excluded patients with a documented contraindication for surgery (44 KPNC members, 79 non-members). To facilitate comparison to previous studies of NSCLC treatment disparities, several of which have used SEER-Medicare data, we also restricted inclusion of KPNC members and non-members to those ages 65 and older (1,053 KPNC members, 3,801 non-members). Finally, because stereotactic body radiotherapy (radiosurgery) became available during our study period as an alternative treatment for early-stage NSCLC patients who are ineligible for surgery, we also considered a composite outcome of surgical resection or radiosurgery (28 KPNC members and 89 non-members in our sample received radiosurgery).

3. Results

3.1 Characteristics of KPNC Members and Non-members

Our final sample consisted of 5,786 patients with stage I or II NSCLC, including 1,565 KPNC members and 4,221 non-members (Table 1). By race/ethnicity, a slightly greater proportion of KPNC vs. non-KPNC patients were black (8% vs. 6%) and Asian/Pacific Islander (15% vs. 12%). Compared to non-members, KPNC members were more likely to be female (58% vs. 53%) and married (59% vs. 56%). Nearly of all non-members (99%) had insurance. Most (56%) were covered by Medicare; 27% had private insurance; 8% had Medicaid; and 9% had other/unknown insurance. KPNC members were also more commonly diagnosed with stage I vs. stage II disease (83% vs. 80%). Patients residing in the lowest SES areas were substantially more likely to receive care outside of KPNC (28% vs. 18%).

The distribution of patient characteristics by surgery receipt among KPNC members and non-members is displayed in Table 2. Across both groups, older patients, unmarried patients, and those living in lower SES areas were less likely to undergo surgery, as were those with larger tumors or stage II (versus stage I) disease. In addition, females were more likely to

undergo surgery than males, although this difference was not statistically significant among KPNC members. Restricted to patients who did not undergo surgery, KPNC members were slightly more likely to receive radiation, but less likely to receive chemotherapy than non-members. Among those who underwent surgery, receipt of radiation and chemotherapy was fairly similar for members and non-members.

3.2 Racial/Ethnic Differences in Surgery Receipt Between KPNC Members and Nonmembers

In unadjusted analyses, regardless of membership status, Black patients were the least likely of all racial/ethnic groups to undergo surgery, and were substantially less likely to do so than White patients (KPNC members: 65% Black vs. 78% White; nonmembers: 64% Black vs. 77% White; $p < 0.0001$ for both comparisons). Among KPNC members, Hispanic and White patients were similarly likely to undergo surgery (82% Hispanic vs. 78% White, $p = 0.72$). In contrast, among non-members, Hispanic patients were 6% less likely than White patients to undergo surgery (71% vs. 77%, $p = 0.02$). In both groups, API patients were the mostly likely to receive surgery; however, the API-White difference was larger and statistically significant only among KPNC members (members: 88% API vs. 78% White, $p < 0.01$; non-members: 79% vs. 77%, $p = 0.35$) (see Figure 1).

After adjustment for potential confounding variables, Black-White surgery disparities of similar magnitude persisted among KPNC members (aRR, 0.82; 95% CI: 0.73–0.93) and non-members (aRR, 0.86, 95% CI: 0.80–0.94). Within KPNC, there were no differences in the likelihood of surgery receipt among White, Hispanic, and API patients (see Table 3). Similarly outside of KPNC, there were no differences in likelihood of surgery receipt between white and API patients; however, Hispanic non-member patients were 7% less likely than their White counterparts to receive surgery (aRR: 0.93, 95% CI: 0.86–1.00).

In sensitivity analyses examining the proportion of patients in each racial group who died or were lost to follow-up within one month and six months of NSCLC diagnosis, we observed no statistically significant differences by race/ethnicity among KPNC members or non-members. In models excluding patients who died or were lost to follow-up within one month and six months, and in models restricting inclusion to patients without a documented contraindication for surgery, disparities estimates were consistent with those from our main analyses (data not shown). Disparities estimates were also similar when we considered the composite outcome of surgical resection or radiosurgery (data not shown). When we restricted inclusion to patients ages 65 and older, Black-White disparities widened among KPNC members (aRR: 0.75, 95% CI: 0.62–0.91), but not among non-members (aRR: 0.89, 95% CI: 0.78–1.00). The Hispanic-White difference also widened slightly among non-members (aRR: 0.90, 95% CI: 0.80–1.00).

4. Discussion

Our study examined disparities in receipt of guideline-recommended surgery among patients with early-stage NSCLC in Northern California from 2004 to 2011. We identified disparities among patients who were members of a fully integrated health care system and among patients who received their care elsewhere. Although the overall proportion of patients

undergoing surgery was higher within KPNC, contrary to our hypothesis, access to integrated care (through KPNC membership) did not appear to attenuate disparities in surgery receipt. In particular, Black patients were substantially less likely than White patients to undergo surgery, regardless of access to integrated care.

To our knowledge, this is the first study to examine NSCLC surgery disparities in an integrated health care system other than the Veterans Affairs (VA) system. Because differences exist between veterans and the general population in terms of sociodemographic characteristics and health status,²⁴ the extent to which care patterns observed in VA-based studies extend to other settings is unclear. Our study confirms the conclusions of prior VA-based work, which documented Black-White disparities in surgical treatment for lung cancer,⁸ finding similar disparities in a different integrated system whose membership is largely representative of the insured population in its covered region. Our study is also the first to directly compare initial treatment for NSCLC between members and non-members of a fully integrated health care system living in the same geographic region.

Further, our analysis is distinctive in its use of contemporary data. Until now, the most up-to-date analysis of surgical disparities using SEER-Medicare data focused on patients diagnosed through 2005.²⁵ Outside of SEER-Medicare, the most recent data on treatment disparities in early stage NSCLC comes from a study of veterans diagnosed through 2007.⁸ Based on the results of our study, which included patients diagnosed through 2011, Black patients have continued to undergo recommended surgery at lower rates than White patients, suggesting a potential lack of progress in providing high-quality care for all lung cancer patients. As health care systems across the U.S. work to implement new recommendations for lung cancer screening,²⁶ rates of detection of early-stage, potentially resectable NSCLC are expected to increase considerably.²⁷ If tumors are increasingly detected at earlier stages, but not resected for all eligible patients, treatment and survival disparities may worsen. Therefore, it is critical to understand the underlying causes of racial differences in NSCLC treatment to inform interventions to close existing gaps.

Based on our results, the Black-White disparity in receipt of surgical resection appears to persist, even within an integrated system designed to provide uniform, coordinated access to needed services for its members. This finding is contrary to our hypothesis that disparities would be smaller, if not mitigated altogether, within KPNC as an “equal access” system, informed in part by prior research that found fewer disparities in colorectal cancer care and outcomes among members of integrated systems, compared to non-members in California. In general, however, evidence about the existence of disparities in integrated systems is mixed. Our results are more in line with those of VA-based cancer studies^{8,13} and Kaiser Permanente-based studies²⁸ of other procedural services, which have concluded that disparities in care are not addressed by integrated system membership alone.

Specifically, in our main analysis of patients ages 21–80 at NSCLC diagnosis, observed Black-White disparities were very similar in magnitude among KPNC members and non-members. In a sensitivity analysis restricted to patients ages 65 and older, the Black-White disparity widened among KPNC members, but not among nonmembers. The magnitude of the disparity was greater among KPNC members only, given that a higher percentage of

Black KPNC member versus non-member patients were aged 65 and older (65% vs. 47%) and that a much higher percentage of Black KPNC member versus non-member patients younger than 65 received surgery (84% vs. 64%), but a lower percentage of black KPNC member versus non-member patients aged 65 and older received surgery (55% vs. 63%). For the other racial/ethnic groups by age (<65, 65+), the percentage who received surgery was the same or higher in KPNC members than non-members. Explaining this variation in the proportion of younger and older Black patients receiving surgery within versus outside of KPNC represents an area for future investigation.

There are several reasons why disparities may be observed irrespective of the extent of access to integrated care. For example, others have suggested that racial differences in receipt of resection for NSCLC may result at least in part from differential eligibility for surgery, given prior reports that Black patients with cancer tend to have a greater comorbidity burden than their White counterparts.^{29–31} However, empirical investigations of the relationships between race, comorbidity burden, and receipt of resection among veterans with early-stage NSCLC have concluded that the lower rates of resection among Black patients appear to result from factors other than racial differences in comorbidity.^{2,8} Further, disparities in resection receipt are known to exist even among patients who are deemed healthy enough to undergo surgery, due to higher rates of refusal among Black patients, potentially explained by cultural differences in health beliefs and attitudes. Cykert and colleagues found that, among NSCLC patients, worse perceptions of physician communication and a lower certainty of lung cancer diagnosis were associated with lower likelihood of surgery receipt.³ These factors may stem from lower confidence in health care providers, a sentiment more prevalent among Black compared to White patients.³² In addition, prior studies have shown that Black NSCLC patients are more likely than White patients to hold misperceptions about lung tumor resection, namely, that surgery is associated with accelerated tumor spread.^{33,34} Provider- and system-level factors may also contribute to disparities. For example, prior research suggests that health care providers' treatment recommendations may be influenced by implicit biases. In particular, providers may not recommend potentially beneficial interventions to patients whom they expect to be nonadherent.³⁵

Data on racial/ethnic treatment differences for non-Black minorities are scarce, and our study builds upon the limited evidence base in this area. As previously reported by others,³⁶ we observed that, after adjustment, API and White patients were equally likely to undergo surgery; this was true of KPNC members and non-members. Also consistent with prior evidence,³⁷ we observed that, among non-members, Hispanics were less likely than whites to undergo surgery. This disparity did not exist among KPNC members. It is possible that, due to the smaller number of KPNC members relative to non-members, we lacked the statistical power to detect a significant Hispanic-White difference in our setting; however, the magnitude of the estimated Hispanic-White difference was also smaller among KPNC members (2% among members ages 21–80; 8% among members ages 65–80) than it was among non-members (7% among non-members ages 21–80; 13% among non-members ages 65–80). It may be that Hispanic KPNC members are systematically different from Hispanic non-members in ways that may affect their access to and use of recommended treatment,

namely, with respect to SES or education. Unfortunately, our study lacked access to individual-level information about these factors.

The results of our study should be interpreted in the context of some additional limitations. Because we used data from the CCR, which does not contain information about patients' comorbidities, pulmonary function measures, or functional status, we were unable to adjust for patients' overall health status, which may affect their candidacy for surgery. To the extent that Black patients are at higher risk for comorbid conditions, comorbidity may have been an important omitted variable, that if included, may have somewhat attenuated the Black-White disparities we observed. Given prior evidence that Black-White differences in comorbidity burden do not entirely explain treatment disparities,^{2,8} it seems unlikely that accounting for comorbidity burden would have substantially altered our estimates. We attempted to address this potential limitation by conducting a sensitivity analysis excluding patients who, according to the CCR, had a documented contraindication for surgery; this exclusion did not affect our results. In addition, the CCR only captures data on initial treatment, occurring up to six months after diagnosis. Therefore, it is possible that patients in our cohort classified as not receiving surgery did, in fact, receive surgery. However, previous research suggests that, on average, definitive surgery for NSCLC occurs before six months post-diagnosis.^{38,39} Finally, the CCR contains limited information about insurance status. Therefore, we cannot be certain that NSCLC classified as non-members of KPNC did not receive some level of integrated care elsewhere. Given that KPNC is by far the largest and only fully integrated system in Northern California, covering a third of the region's insured population, we do not expect this potential limitation to have substantially impacted our findings.²⁰

We observed that Black-White disparities in receipt of resection for early-stage NSCLC were similar in magnitude for integrated system members and non-members. Our findings suggest that factors not strictly related to access to surgical care may underlie the disparities observed in our and other studies. Future research should focus on the roles of other factors, especially modifiable factors (e.g., patient-provider communication), in explaining disparities for treating early stage NSCLC, with the goal of informing interventions to overcome them.

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Highlights:

- Regardless of care setting, black patients were least likely to receive surgery
- Black-white differences were similar in integrated and non-integrated settings
- With integrated care, surgery receipt was similar in Hispanic and white patients
- With non-integrated care, surgery was slightly less common in Hispanic patients
- Asian and white patients were equally likely to receive surgery in both settings

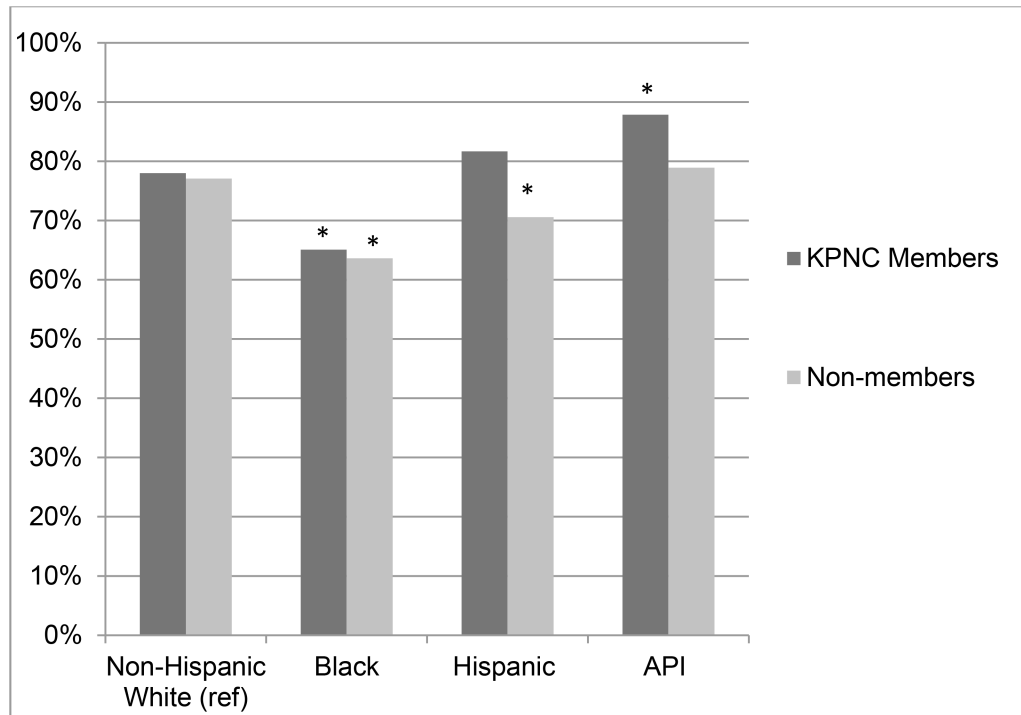


Figure 1. Proportions of Patients Receiving Surgery, by Race/Ethnicity and KPNC Membership Status

* $p < 0.05$ for comparison between minority group and Non-Hispanic White patients within each membership group

Table 1.

Distribution of Patient Characteristics Among KPNC Members and Non-members

Characteristic	N	KPNC	Non-members	p-value
		Members (N=1565)	(N=4221)	
Age at diagnosis, years				
<60	1120	279 (17.8)	841 (19.9)	0.06
60–69	2002	575 (36.7)	1427 (33.8)	
70+	2664	711 (45.4)	1953 (46.3)	
Race/Ethnicity				
Non-Hispanic White	4312	1137 (72.6)	3175 (75.2)	0.001
Black	390	126 (8.1)	264 (6.3)	
Hispanic	326	71 (4.5)	255 (6.0)	
Asian/Pacific Islander	758	231 (14.8)	527 (12.5)	
Gender				
Male	2650	664 (42.4)	1986 (47.0)	0.002
Female	3136	901 (57.6)	2235 (53.0)	
Marital status				
Single	2379	564 (36.0)	1815 (43.0)	<0.0001
Married/Partnered	3279	927 (59.2)	2352 (55.7)	
Unknown	128	74 (4.7)	54 (1.3)	
Socioeconomic status				
I (low)	1447	278 (17.8)	1169 (27.7)	<0.0001
II	1446	387 (24.7)	1059 (25.1)	
III	1446	463 (29.6)	983 (23.3)	
IV (high)	1447	437 (27.9)	1010 (23.9)	
Tumor stage, AJCC 6th ed.				
I	4671	1297 (82.9)	3374 (79.9)	0.01
II	1115	268 (17.1)	847 (20.1)	
Tumor size				
1.5	898	242 (15.5)	656 (15.5)	0.008
1.6–3.0	2378	686 (43.8)	1692 (40.1)	
3.1–4.5	1269	328 (21.0)	941 (22.3)	
4.6	1104	287 (18.3)	817 (19.4)	
Unknown		22 (1.4)	115 (2.7)	
Histologic subtype				
Adenocarcinoma	3253	766 (48.9)	2487 (58.9)	<0.0001
Squamous cell carcinoma	1443	386 (24.7)	1057 (25.0)	
Other	514	249 (15.9)	265 (6.3)	
NSCLC, NOS	576	164 (10.5)	412 (9.8)	

Table 2.

Distribution of Patient Characteristics by Surgery Receipt Among KPNC Member and Non-members

Characteristic, N (%)	KPNC Members (N=1565)		p-value	Non-members (N=4221)		p-value
	Surgery (N=1252)	No Surgery (N=313)		Surgery (N=3212)	No Surgery (N=1009)	
Age at diagnosis, years						
<60	261 (20.8)	18 (5.7)	<0.0001	706 (22.0)	135 (13.4)	<0.0001
60–69	494 (39.5)	81 (25.9)		1122 (34.9)	305 (30.2)	
70+	497 (39.7)	214 (68.4)		1384 (43.1)	569 (56.4)	
Race/Ethnicity						
Non-Hispanic White	909 (72.6)	228 (72.8)	<0.0001	2448 (76.2)	727 (72.1)	<0.0001
Black	82 (6.6)	44 (14.1)		168 (5.2)	96 (9.5)	
Hispanic	58 (4.6)	13 (4.2)		180 (5.6)	75 (7.4)	
Asian/Pacific Islander	203 (16.2)	28 (8.9)		416 (13.0)	111 (11.0)	
Gender						
Male	517 (41.3)	147 (47.0)	0.07	1466 (45.6)	520 (51.5)	0.001
Female	735 (58.7)	166 (53.0)		1746 (54.4)	489 (48.5)	
Marital status						
Single	422 (33.7)	142 (45.4)	<0.0001	1275 (39.7)	540 (53.5)	<0.0001
Married/Partner	777 (62.1)	150 (47.9)		1903 (59.3)	449 (44.5)	
Unknown	53 (4.2)	21 (6.7)		34 (1.0)	20 (2.0)	
Socioeconomic status						
I (low)	202 (16.1)	76 (24.3)	0.003	800 (24.9)	369 (36.6)	<0.0001
II	307 (24.5)	80 (25.5)		780 (24.3)	279 (27.7)	
III	388 (31.0)	75 (24.0)		780 (24.3)	203 (20.1)	
IV (high)	355 (28.4)	82 (26.2)		852 (26.5)	158 (15.6)	
Tumor stage						
I	1052 (84.0)	245 (78.3)	0.02	2620 (81.6)	754 (74.7)	<0.0001
II	200 (16.0)	68 (21.7)		592 (18.4)	255 (25.3)	
Tumor size						
1.5	209 (16.7)	33 (10.5)	<0.0001	569 (17.7)	87 (8.6)	<0.0001
1.6–3	584 (46.6)	102 (32.6)		1367 (42.6)	325 (32.2)	
3.1–4.5	251 (20.0)	77 (24.6)		721 (22.4)	220 (21.8)	
4.6+	201 (16.1)	86 (27.5)		530 (16.5)	287 (28.4)	
Unknown	7 (0.6)	15 (4.8)		25 (0.8)	90 (8.9)	
Histologic subtype						
Adenocarcinoma	660 (52.7)	106 (33.9)	<0.0001	2112 (65.8)	375 (37.2)	<0.0001
Squamous cell carcinoma	281 (22.4)	105 (33.5)		718 (22.3)	339 (33.6)	
Other	231 (18.5)	18 (5.8)		214 (6.7)	51 (5.0)	
NSCLC, NOS	80 (6.4)	84 (26.8)		168 (5.2)	244 (24.2)	
Radiation therapy received¹						
Yes, radiosurgery	1 (0.1)	27 (8.6)		4 (0.1)	85 (8.4)	<0.0001
Yes, other radiation therapy	63 (5.03)	160 (51.1)		242 (7.5)	483 (47.9)	

Characteristic, N (%)	KPNC Members (N=1565)		p-value	Non-members (N=4221)		p-value
	Surgery (N=1252)	No Surgery (N=313)		Surgery (N=3212)	No Surgery (N=1009)	
No	1188 (94.9)	126 (40.3)		2966 (92.3)	441 (43.7)	
Chemotherapy received						
Yes	270 (21.6)	86 (27.5)	0.03	682 (21.2)	341 (33.8)	<0.0001
No	982 (78.4)	227 (72.5)		2530 (78.8)	668 (66.2)	

¹p-value not reported for KPNC members due to small cell sizes

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Table 3.

Adjusted Risk Ratios and 95% Confidence Intervals (CI)¹ for Surgery Receipt, Among KPNC Members and Non-members

	<u>KPNC members</u>	<u>Non-members</u>
Non-Hispanic White	1.00 (reference)	1.00 (reference)
Black	0.82 (0.73–0.93)	0.86 (0.80–0.94)
Hispanic	0.98 (0.89–1.08)	0.93 (0.86–1.00)
Asian/Pacific Islander	1.02 (0.97–1.07)	0.97 (0.93–1.01)

¹Models adjusted for: age at NSCLC diagnosis, gender, marital status, area-level SES and tumor stage, size, and histologic subtype

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