Patient-Level Factors Associated with Oncology Provider-Delivered Brief Tobacco Treatment Among Recently Diagnosed Cancer Patients

$\circledS$ SAGE

Neil JM[1] [iD], Price SN[2], Friedman ER[3], Ponzani C[1], Ostroff JS[4], Muzikansky A[1] and Park ER[1]

[1]Harvard Medical School/Massachusetts General Hospital, Boston, MA, USA. [2]University of Arizona, Tucson, AZ, USA. [3]Vanderbilt University, Nashville, TN, USA. [4]Memorial Sloan Kettering Cancer Center, New York City, NY, USA.

ABSTRACT

BACKGROUND: A cancer diagnosis is seen as a "teachable moment" for patients to consider changing their behavioral risk factors, such as smoking. It also offers an opportunity for oncology providers to engage in a dialogue about how they can support patients changing their smoking behaviors. Brief, evidence-based tobacco cessation treatment delivered by oncology providers through the 5As (Ask, Advise, Assess, Assist Arrange) model is recommended, but provision to cancer patients remains suboptimal.

AIM: Explore patient-level factors associated with 5As receipt among current smokers with a newly diagnosed cancer.

METHOD: A total of 303 patients self-reported whether they received each of the 5As during their most recent oncology care visit. Multivariable regression analyses were conducted to identify patient-level factors associated with 5As receipt.

RESULTS: Oncology provider-delivered 5As rates ranged from 81.5% (Ask) to 30.7% (Arrange). 5As receipt was associated with: reporting lower illness-related stigma, diagnosis of a comorbid smoking-related disease, diagnosis of a smoking-related cancer, and diagnosis of a non-advanced cancer.

CONCLUSION: Findings support previous literature in which smoking-related diagnoses were associated with greater receipt of 5As; however, disparities in the receipt of 5As existed for patients with more advanced cancer diagnoses and illness-related stigma. Inequities in the provision of quit assistance may further decrease treatment effectiveness and survival expectancy among certain patient populations. These findings are, therefore, important as they identify specific patient-level factors associated with lower 5As receipt among newly diagnosed cancer patients.

KEYWORDS: 5As, smoking, cancer diagnosis, stigma, disparities

Approximately 40% of all cancer diagnoses are smoking-related, and less than half of patients attempt to quit smoking post-diagnosis.[1–3] Prevalence estimates of continued smoking among cancer patients range from 12.7% to 16.4%, with rates as high as 31.1% among some cancer types.[4,5] These high rates of continued smoking among cancer patients are cause for concern, since persistent smoking post-diagnosis is associated with numerous adverse outcomes, including decreased treatment effectiveness, increased risk of recurrence, and decreased survival.[6] As such, a cancer diagnosis is seen as a "teachable moment" through which healthcare providers can intervene by providing tobacco cessation advice and assistance.[7]

The important role of clinicians in the tobacco cessation process is highlighted in the United States Preventive Services Task Force's Clinical Practice Guidelines[8] for smoking cessation. Guidelines recommend that healthcare clinicians follow the 5As model of brief tobacco intervention for every visit they have with the patient: (1) *ask* all patients about their tobacco use, (2) *advise* all smokers to quit, (3) *assess* willingness to quit, (4) *assist* smokers with cessation, including counseling and pharmacotherapy, and (5) *arrange* follow-up contact for relapse prevention.[8] Despite accumulation of evidence supporting the need for smoking cessation in the context of cancer care, historically, tobacco use has been poorly addressed and cessation assistance infrequently delivered in oncology clinics, with clinician adherence to the 5As sub-optimal.[9]

While provider-level characteristics associated with variation in 5As delivery are more clearly identified, fewer studies have examined patient characteristics associated with 5As receipt, especially among cancer patients. Previous studies have supported the association between patient-reported 5As and successful quitting,[10] and approaches that capitalize on teachable moments within the cancer care continuum are vital to improve cessation outcomes for all cancer patients. Inequities in the receipt of provider-delivered brief tobacco treatment may only exacerbate existing disparities in smoking

rates and treatment outcomes among sub-populations of oncology patients. The current study explores patient-level factors associated with self-reported 5As receipt to highlight variation in oncology care delivery of tobacco cessation services among a recently diagnosed cancer patient population.

Method

Sample

A total of 303 participants with suspected or newly diagnosed cancers (within 3 months or 4 office visits) were enrolled in a clinical trial comparing the effects of combined pharmacotherapy and intensive smoking cessation counseling to standard treatment. Eligible participants were adult (age ≥ 18) current smokers (self-reported smoking a cigarette, even a puff, within the last 30 days), who were English or Spanish-speaking and receiving their oncology care at 2 major academic medical centers in the Northeast (see Table 1 for participant characteristics). In order to participate, patients were not required to want to quit at the time of enrollment, instead, they only had to be willing to talk to a tobacco treatment counselor about their smoking. Patients were excluded if they did not have regular access to a telephone, were medically ineligible, or had current, active, untreated psychiatric illness and suicidal ideation-related hospitalizations within the past year.

At Site 1, potential participants were identified using multiple recruitment approaches, including (1) collection of a smoking status intake form; (2) screening of daily clinic patient lists; and (3) direct provider referrals. For Site 2, eligible patients were identified through either (1) routine assessment of smoking status and referral of current smokers to the Site's Tobacco Treatment Program (TTP) or (2) clinic-based identification of smokers in outpatient clinics. When possible, study visits were conducted in conjunction with patients' existing oncology visits in order to minimize participant burden. Detailed protocol methods and eligibility criteria have been published previously (Park et al., 2016).[11] This research was approved by the institutional review boards at each participating site.

Measures

Participants completed self-report baseline questionnaires prior to randomization and medical information was extracted from participants' electronic health records (EHR). Participants reported sociodemographics (e.g., race), smoking characteristics (time to first cigarette, recent quit attempt, whether they lived with another smoker in their household), and illness-related stigma, while gender, diagnosis of a comorbid smoking-related disease, cancer type, and stage of diagnosis were collected from their EHR.

Illness-related stigma was measured with a five-item, four-point Likert scale (α = .76, M = 10.43, SD = 3.90).[12] The scale measured dimensions of internalized shame and has been used previously to measure stigma in the context of lung cancer,[13] as well as other cancer and patient-provider communication settings.[14–16] Participants indicated the degree they endorsed the following items: "I feel others think I am to blame for my illness;" "I do not feel I can be open with others about my illness;" "I fear someone telling others about my illness without my permission;" "I feel I need to keep my illness a secret;" "I feel I am at least partially to blame for my illness." Participant scores were retained if they answered any 4 of the 5 items, with the missing fifth item mean-imputed.

Participant-reported receipt of brief cessation treatment (5As) was measured by asking patients 5 yes/no questions with the following stem, "During your last visit, did your oncology care provider(s) (e.g., doctor, nurse) do any of the following?": (1) Ask about your current tobacco use; (2) Advise you to quit smoking; (3) Assess your readiness to quit; (4) Assist you in quitting smoking; and (5) Arrange follow-up. Assist was further separated into (4a) Assist-talk (talk to you about quitting smoking); (4b) Assist-counseling (recommend cessation counseling); and (4c) Assist-NRT (recommend nicotine replacement therapy or other cessation pharmacotherapy).

Statistical analysis

All analyses were conducted using SPSS v25. Descriptive analyses were used to calculate frequency and central tendency statistics for participant characteristics (Table 1). A series of univariate analyses were conducted to preliminarily identify covariates to include in the multivariable logistic regression analyses (α level below .10 retained). In the multivariable logistic regression analyses, variables were included using an Enter method, with each model block including factors if they met the univariate criteria (e.g., block 1 controlled for patient sociodemographic characteristics [gender, race], 2 for smoking characteristics [time to first cigarette, quit attempt, household smoker], 3 for illness-related stigma, and 4 for medical history [comorbid smoking-related disease, smoking-related cancer, tumor stage]). In total, 6 separate multivariable logistic regressions were conducted to examine each of the 5As (Table 2). Separate regressions were conducted for each of the Assist variables (talk, counseling, and medication), but there were no univariate factors associated with Assist (talk), so it was not included in the final multivariable analyses.

There were no missing data for patient age, gender, race, smoking-related disease, smoking-related cancer type, or stage of diagnosis variables. Participants responded if they had a recent quit attempt (n = 200/303, 66.01%) or lived with another household smoker (n = 221/303, 72.93%). Data missingness was missing at random and considered minimal[17] for the following variables: Hispanic/Latinx ethnicity (n = 10/303, 3.33%), employment status (n = 7/303, 2.31%), level of education (n = 8/303, 2.64%), whether participant was partnered (n = 8/303, 2.64%), cigarettes smoked per day (n = 4/303, 1.32%), time to first cigarette (n = 6/303, 1.98%), illness-related stigma (n = 16/303, 5.28%), as well as 5As receipt: Ask

Table 1. Patient characteristics (N = 303).

VARIABLE	M(SD)/N(%)	RANGE
Age (years)	58.34 (9.71)	21–86
Female	170 (56.11)	
Race		
American Indian/Alaska Native	3 (1.00)	
Asian	2 (0.66)	
Black/African American	31 (10.23)	
White	265 (87.46)	
Other	2 (0.66)	
Ethnicity (Hispanic/Latino)	11 (3.63)	
Partnered	164 (54.13)	
Employed (full or part-time)	130 (42.90)	
Education (Some college or more)	202 (66.67)	
Cigarettes per day	14.08 (9.89)	1–70
Time to first cigarette (Under 30 minutes)	214 (70.63)	
Recent quit attempt (Less than 6 months)	81 (26.73)	
Household smoker (One or greater)	93 (30.69)	
Illness-related stigma	10.43 (3.90)	5–25
Comorbid smoking-related disease	148 (48.84)	
Smoking-related cancer[a]	181 (59.74)	
Cancer type		
Thoracic	93 (30.69)	
Breast	77 (25.41)	
Genitourinary	51 (16.83)	
Gastrointestinal	29 (9.57)	
Head & Neck	31 (10.23)	
Lymphoma	9 (2.97)	
Gynecological	7 (2.31)	
Melanoma	6 (1.98)	
Stage of diagnosis (Advanced)[b]	111 (36.6)	
Cancer stage		
0	17 (6.16)	
I	86 (31.16)	
II	67 (24.28)	
III	53 (19.20)	
IV	53 (19.20)	
Non-solid indolent	3 (0.99)	

(Continued)

Table 1. (Continued)

VARIABLE	M(SD)/N(%)	RANGE
Non-solid advanced	5 (1.65)	
NA/Unknown	19 (6.27)	
5As		
Ask	247 (81.5)	
Advise	228 (75.2)	
Assess	220 (72.6)	
Assist (talk)	139 (45.9)	
Assist (counseling)	166 (54.8)	
Assist (medication)	131 (43.2)	
Arrange	93 (30.7)	

[a]Smoking-related cancer was comprised of: anal, bladder, cervical, colorectal, esophageal, gastric, head and neck, kidney, liver, lung, pancreatic, and small intestine cancer types.
[b]Cancer stages III and IV solid tumor and non-solid advanced were bifurcated and classified as advanced were bifurcated and classified as advanced stage of diagnosis.

(n = 13/303, 4.29%), Advise (n = 13/303, 4.29%), Assess (n = 15/303, 4.95%), Assist-talk (n = 21/303, 6.93%), Assist-counseling (n = 23/303, 7.59%), Assist-medication (n = 16/303, 5.28%), and Arrange (n = 16/303, 5.28%). Rates for all variables are reported for participants who responded to the survey items.

Results

Descriptive analyses

Overall, oncology provider-delivered smoking cessation 5A rates were as follows: Ask, 81.5%; Advise, 75.2%; Assess, 72.6%; Assist-talk, 45.9%; Assist-counseling, 54.8%; Assist-medication, 43.2%; and Arrange, 30.7%.

Logistic regression

Ask. The first multivariable logistic regression model examined associations with receipt of Ask, with the final model significant, X^2 (1) = 4.16, P = .041, −2 Log likelihood (−2LL) = 239.27, Cox and Snell R^2 = .014. Based on univariate analyses, only a diagnosis of a smoking-related cancer was included in the model (odds ratio [OR], 1.97, 95% confidence interval [CI], 1.03-3.79, P = .042), such that patients diagnosed with smoking-related cancers were significantly more likely to report being asked about their smoking.

Advise. The second regression examined receipt of Advise, with the final model significant, X^2 (4) = 22.46, P < .001, −2LL = 263.02, Cox and Snell R^2 = .079. Based on univariate analyses, race, time to first cigarette, diagnosis of a smoking-related cancer, and tumor stage were included in the model. Participants with a smoking-related cancer were significantly

Table 2. Multivariable logistic regression models predicting receipt of the 5As.

PREDICTOR	ASK	ADVISE	ASSESS	ASSIST COUNSEL.	ASSIST MEDICATION	ARRANGE
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Sociodemographics						
Gender	-	-	-	-	-	-
Male					Ref.	Ref.
Female					0.66 (0.40, 1.09)	0.63 (0.38, 1.04)
Race	-	-	-	-	-	-
White	Ref.	Ref.				
Other	1.97 (1.03, 3.79)*	0.48 (0.22, 1.05)				
Smoking characteristics						
Time to first cig.	-	Ref.	-	-	-	-
Over 30 minutes		Ref.				
Under 30 minutes		1.66 (0.89, 3.15)				
Recent quit attempt[a]	-	-	-	-	-	-
Greater than 6 months			0.55 (0.29, 1.06)			
Less than 6 months			1.15 (0.52, 2.52)			
Household smoker	-	-	-	-	-	-
None					Ref.	
One or greater					0.60 (0.36, 1.02)	
Illness-related stigma	-	-	**0.60 (0.42, 0.85)****	**0.68 (0.49, 0.93)***	-	-
Medical history						
SRD	-	-	-	-	-	-
No				Ref.	Ref.	Ref.
Yes				1.56 (0.95, 2.56)	**1.64 (1.01, 2.65)***	**1.86 (1.13, 3.09)***
SRC						-
No	Ref.	Ref.			Ref.	
Yes		**2.19 (1.16, 4.14)***			1.33 (0.79, 2.21)	
Stage of diagnosis		Ref.			-	-
Non-advanced		Ref.				
Advanced		**0.39 (0.21, 0.73)****				

Assist multivariable model not included as no predictors were identified in the univariate analyses.

Abbreviations: SRD, comorbid smoking-related disease; SRC, smoking-related cancer.

[a]Not all participants had attempted to quit smoking prior to study enrollment, recent quit attempt was trichotomized with no previous quit attempt coded as a reference category.

*$P < 0.05$; **$P < 0.01$.

more likely to report receipt of Advise (OR, 2.19, 95% CI, 1.16-4.14, *P* = .016), but participants with advanced tumor staging were significantly less likely to be advised to quit (OR, 0.39, 95% CI, 0.21–0.73, *P* = .003).

Assess. The third regression examined receipt of Assess, with the final model significant, X^2 (3) = 13.51, *P* = .004, −2LL = 296.93, Cox and Snell R^2 = .047. Based on the univariate analyses, recent quit attempt and illness-related stigma were included in this model. Participants who reported greater stigma were significantly less likely to report receiving an assessment on their readiness to quit (OR, 0.60, 95% CI, 0.42-0.85, *P* = .004).

Assist (talk). There were no variables associated with receipt of Assist-talk.

Assist (counseling). The fourth regression examined receipt of Assist-counseling, with the final model significant, X^2 (2) = 8.36, *P* = .015, −2LL = 360.19, Cox and Snell R^2 = .030. Based on univariate analyses, illness-related stigma and comorbid smoking-related disease were included in the multivariable analysis. Participants who reported greater illness-related stigma reported significantly lower receipt of Assist-counseling (OR, 0.68, 95% CI, 0.49–0.93, *P* = .017).

Assist (medication). The fifth regression examined receipt of Assist-medication, with the final model significant, X^2 (4) = 14.38, *P* = .006, -2LL = 381.31, Cox and Snell R^2 = .049. Included in this model were gender, number of household smokers, comorbid smoking-related disease, and smoking-related cancer. A diagnosis of a comorbid smoking-related disease was significantly associated with receiving Assist-medication (OR, 1.64, 95% CI, 1.01–2.65, *P* = .046).

Arrange. The sixth and final regression examined receipt of Arrange, with the final model significant, X^2 (2) = 9.24, *P* = .01, −2LL = 352.31, Cox and Snell R^2 = .032. Based on the univariate analyses, gender and comorbid smoking-related disease were included in the multivariable model. Participants who had a diagnosis of a comorbid smoking-related disease (OR, 1.86, 95% CI, 1.13–3.09, *P* = .016) were significantly more likely to report having had follow-up services arranged to help them quit.

Discussion

The current study provides important insight into patient-level factors associated with receipt of 5As among recently diagnosed cancer patients. Extant literature has relied heavily on clinician-reported patterns of tobacco treatment delivery, which offer valuable understanding of variation in the delivery of 5As but may overlook patient perceptions of the type of brief tobacco treatment they have been offered. The current study highlighted variation in patient-reported receipt of 5As, and found there were no differences in receipt based on patient sociodemographic characteristics or smoking behaviors, which is in contrast to previous research among other patient populations highlighting differences by age, sex, race, and nicotine dependence.[18] Instead, the current study found that patients reported differential receipt of 5As based on their medical history and their level of illness-related stigma. These findings align with previous 5As research and identify new patient-level factors (illness-related stigma, advanced disease) associated with 5A delivery, highlighting the importance of effective provider-patient communication about tobacco cessation among potentially stigmatized patient groups.

Medical history factors were consistent with previous findings, such that patients with smoking-related cancer diagnoses reported greater receipt of Ask and Advise, and patients with a comorbid smoking-related disease reported greater receipt of Assist-medication and Arrange. Prior research has shown that diagnoses closely linked to smoking behaviors typically increase physician communication about cessation services.[19] However, an interesting finding was lower receipt of Advise among patients with more advanced cancers. This may be partly explained by providers underestimating the value in quitting among patients with advanced cancer due to inadequate time to benefit from quitting, or deprioritizing other health goals in the context of dealing with a life-limiting current diagnosis. Providers may also perceive patients with advanced cancer to be more overwhelmed or less motivated to quit, a perception which has been identified as a barrier to 5As delivery.[9,20]

Further, importance of patient-provider communication was underscored as patients with greater illness-related stigma were less likely to report talking with a provider about quitting (Assess) or being referred to counseling (Assist-counseling). This finding is consistent with previous 5As literature, in which illness-related stigma can function as a barrier for disclosing smoking behavior and discussing tobacco cessation.[21,22] However, the vast majority of smoking-related illness stigma research has been conducted only among lung cancer patients.[23] Half of lung cancer patients acknowledge feeling stigmatized by their medical provider, and by assessing smoking history and/or willingness to quit without applying empathic communication skills, some oncology providers may inadvertently insinuate that cancer patients with a smoking-related diagnosis are to blame for their cancer.[24]

Hamann et al[25] established a conceptual model of stigma among lung cancer patients indicating that greater stigma can result from a feedback loop in which patient expectations of negative experiences (i.e., "stigma consciousness") drive overall increases in perceived stigma and in turn increase internalized stigma. It is reasonable to assume that patients experiencing greater guilt surrounding their recent diagnosis (internalized stigma) may have greater fears about provider judgment (perceived stigma), and thereby misreport or minimize their smoking behaviors. This, in turn, may reduce the likelihood of being

advised to quit or offered counseling at the same rate as patients with lower perceptions of illness stigma. Alternatively, it is possible oncology providers may have avoided discussion about tobacco cessation among patients who seemed to be experiencing regret and self-blame for fear of damaging rapport with the patient early in their treatment regimen.[9,26]

Strengths and limitations

A limitation of the current study was assessment of 5As at the time of diagnosis, which does not capture tobacco cessation discussions that may have occurred during previous or subsequent follow-up visits. It is, therefore, a conservative estimate of 5As receipt over the course of a patient's cancer treatment regimen. However, brief tobacco treatment is meant to be offered at each patient encounter, so at a minimum, the current study was able to highlight the rate of adherence to this guideline early in a cancer patient's treatment regimen. As such, future studies should explore receipt of 5As at the point of service and in combination with cessation programs to identify whether receipt changes over the course of a patient's cancer treatment. Another limitation was that the delivery of 5As was measured by patient self-report rather than formal clinical documentation. As highlighted earlier, patient perspectives on the type of brief tobacco treatment they receive are often overlooked within the 5As literature, which has more extensively investigated provider-level correlates of 5As.[27] Finally, as with any clinical cessation trial, there are considerations about how generalizable findings are from research participants to clinical smoking populations. In order to enhance generalizability, participants were proactively recruited for the trial and were not required to want to quit at the time of enrollment. Previous research has also shown that over half of patients smoking at the time of diagnosis and/or treatment are receptive to smoking cessation services.[28,29]

There were notable strengths of the current study, which included assessment of 5A delivery by any oncology care provider (i.e., oncologist, nurse practitioners, physician assistants), where most literature has centered on physicians and/or in primary care settings.[30–32] An additional strength was the diverse patient population, representative of many different cancer stages and types, both smoking- and not-smoking-related. With much literature focusing on how to leverage a "teachable moment" among lung cancer patients, studying a population that is heterogeneous with respect to tumor type permits stronger conclusions to be made about categorizing smoking-related cancer diagnoses collectively, as well as their association with greater receipt of 5As. Further, it expands upon earlier work examining illness-related stigma experienced by patients with a lung cancer diagnosis and suggests that this phenomenon occurs across a variety of cancer types. Importantly, quitting tobacco still has numerous benefits for both quality of life for patients with an advanced stage cancer or with non-smoking-related tumors.[6]

Implications for research and practice

The current study aligns with existing research demonstrating high rates of Ask and Advise (>70%) among patients with a smoking-related cancer diagnosis,[33] but demonstrates higher rates of Assess and Assist compared with this previous work. These higher rates could potentially be explained by the availability of a tobacco cessation counseling intervention through this trial at both sites, as previous research has identified provider uncertainty about where to refer patients as a common barrier to 5As delivery.[9,34] Although more research is required to compare different models of tobacco cessation treatment delivery in oncology settings, results from this study may lend support to having a clearly identified path for referral in order to increase provider delivery of the 5As. It is also important to note that at the time of this study, neither site had implemented EHR-based best practice alerts or decision support systems to promote delivery of 5As, which have been shown to improve provider adherence to tobacco use treatment guidelines.[35] Understanding which patients are less likely to receive the 5As is an important step toward providing more consistent quality care among cancer patients, and future research should continue to leverage teachable moments as a method to improve clinical care and decrease disparities in 5A delivery.

ORCID iD

Neil JM https://orcid.org/0000-0001-5769-4961

REFERENCES

1. Gallaway MS, Huang B, Chen Q, et al. Smoking and smoking cessation among persons with tobacco- and non-tobacco-associated cancers. *J Commun Health*. 2019;44(3):552-560. doi:10.1007/s10900-019-00622-z
2. Jacob L, Freyn M, Kalder M, Dinas K, Kostev K. Impact of tobacco smoking on the risk of developing 25 different cancers in the UK: a retrospective study of 422,010 patients followed for up to 30 years. *Oncotarget*. 2018;9(25):17420-17429. doi:10.18632/oncotarget.24724
3. Tseng TS, Lin HY, Moody-Thomas S, Martin M, Chen T. Who tended to continue smoking after cancer diagnosis: the national health and nutrition examination survey 1999–2008. *BMC Public Health*. 2012;12(1):784. doi:10.1186/1471-2458-12-784
4. Salloum RG, Huo J, Lee JH, et al. Tobacco and E-cigarette use among cancer survivors in the United States. *PLoS One*. 2019;14(12). doi:10.1371/journal.pone.0226110
5. Swoboda CM, Walker DM, Huerta TR. Likelihood of smoking among cancer survivors: an updated health information national trends survey analysis. *Nicotine Tob Res*. 2019;21(12):1636-1643. doi:10.1093/ntr/ntz007
6. US Department of Health and Human Services. *The Health Consequences of Smoking—50 Years of Progress: A Report of the Surgeon General*. Rockville, MD: US Department of Health and Human Services; 2014.
7. Gritz ER, Fingeret MC, Vidrine DJ, Lazev AB, Mehta NV, Reece GP. Successes and failures of the teachable moment: smoking cessation in cancer patients. *Cancer*. 2006;106(1):17-27. doi:10.1002/cncr.21598
8. U.S. Preventive Services Task Force. *Final Recommendation Statement: Tobacco Smoking Cessation in Adults, Including Pregnant Women: Behavioral and*

Pharmacotherapy Interventions; 2017. https://www.uspreventiveservicestaskforce.org/Page/Document/RecommendationStatementFinal/tobacco-use-in-adults-and-pregnant-women-counseling-and-interventions1

9. Price SN, Studts JL, Hamann HA. Tobacco use assessment and treatment in cancer patients: a scoping review of oncology care clinician adherence to clinical practice guidelines in the U.S. *Oncologist*. 2019;24(2):229-238. doi:10.1634/theoncologist.2018-0246

10. Park ER, Gareen IF, Japuntich S, et al. Primary care provider-delivered smoking cessation interventions and smoking cessation among participants in the national lung screening trial. *JAMA Intern Med*. 2015;175(9):1509-1516. doi:10.1001/jamainternmed.2015.2391

11. Park ER, Ostroff JS, Perez GK, et al. Integrating tobacco treatment into cancer care: study protocol for a randomized controlled comparative effectiveness trial. *Contemp Clin Trials*. 2016;50:54-65. doi:10.1016/j.cct.2016.07.016

12. Fife BL, Wright ER. The dimensionality of stigma: a comparison of its impact on the self of persons with HIV/AIDS and cancer. *J Health Soc Behav*. 2000;41(1):50-67.

13. Gonzalez BD, Jim HSL, Cessna JM, Small BJ, Sutton SK, Jacobsen PB. Concealment of lung cancer diagnosis: prevalence and correlates. *Psycho-Oncology*. 2015;24(12):1774-1783. doi:10.1002/pon.3793

14. Schroyen S, Missotten P, Jerusalem G, Van den Akker M, Buntinx F, Adam S. Association between self-perception of aging, view of cancer and health of older patients in oncology: a one-year longitudinal study. *BMC Cancer*. 2017;17. doi:10.1186/s12885-017-3607-8

15. Yang N, Cao Y, Li X, Li S, Yan H, Geng Q. Mediating effects of patients' stigma and self-efficacy on relationships between doctors' empathy abilities and patients' cellular immunity in male breast cancer patients. *Med Sci Monit*. 2018;24:3978-3986. doi:10.12659/MSM.910794

16. Zhang Y, Cui C, Wang Y, Wang L. Effects of stigma, hope and social support on quality of life among Chinese patients diagnosed with oral cancer: a cross-sectional study. *Health Qual Life Out*. 2020;18. doi:10.1186/s12955-020-01353-9

17. Dong Y, Peng CYJ. Principled missing data methods for researchers. *SpringerPlus*. 2013;2. doi:10.1186/2193-1801-2-222

18. Vijayaraghavan M, Yuan P, Gregorich S, et al. Disparities in receipt of 5As for smoking cessation in diverse primary care and HIV clinics. *Prev Med Rep*. 2017;6:80-87. doi:10.1016/j.pmedr.2017.02.012

19. Rigotti NA. Review Smoking cessation in patients with respiratory disease: Existing treatments and future directions. *Lancet*. 2013;1(3):241-250. doi:10.1016/S2213-2600(13)70063-8

20. Weaver KE, Danhauer SC, Tooze JA, et al. Smoking cessation counseling beliefs and behaviors of outpatient oncology providers. *Oncologist*. 2012;17(3):455-462. doi:10.1634/theoncologist.2011-0350

21. Shin DW, Park JH, Kim SY, et al. Guilt, censure, and concealment of active smoking status among cancer patients and family members after diagnosis: a nationwide study. *Psycho-Oncology*. 2014;23(5):585-591. doi:10.1002/pon.3460

22. Simmons VN, Litvin EB, Patel RD, et al. Patient-provider communication and perspectives on smoking cessation and relapse in the oncology setting. *Patient Educ Couns*. 2009;77(3):398-403. doi:10.1016/j.pec.2009.09.024

23. Shen MJ, Hamann HA, Thomas AJ, Ostroff JS. Association between patient-provider communication and lung cancer stigma. *Support Care Cancer*. 2016;24(5):2093-2099. doi:10.1007/s00520-015-3014-0

24. Hamann HA, Lee JW, Schiller JH, et al. Clinician perceptions of care difficulty, quality of life, and symptom reports for lung cancer patients: an analysis from the Symptom Outcomes and Practice Patterns (SOAPP) Study. *J Thorac Oncol*. 2013;8(12):1474-1483. doi:10.1097/01.JTO.0000437501.83763.5d

25. Hamann HA, Ostroff JS, Marks EG, Gerber DE, Schiller JH, Lee SJC. Stigma among patients with lung cancer: a patient-reported measurement model. *Psycho-Oncology*. 2014;23(1):81-92. doi:10.1002/pon.3371

26. Champassak SL, Goggin K, Finocchario-Kessler S, et al. A qualitative assessment of provider perspectives on smoking cessation counselling. *J Eval Clin Pract*. 2014;20(3):281-287. doi:10.1111/jep.12124

27. Kalkhoran S, Appelle NA, Napoles AM, et al. Beyond the ask and advise: implementation of a computer tablet intervention to enhance provider adherence to the 5As for smoking cessation. *J Subst Abuse Treat*. 2016;60:91-100. doi:10.1016/j.jsat.2015.05.009

28. Cooley ME, Emmons KM, Haddad R, et al. Patient-reported receipt of and interest in smoking-cessation interventions after a diagnosis of cancer. *Cancer*. 2011;117(13):2961-2969. doi:10.1002/cncr.25828

29. Tang MW, Oakley R, Dale C, Purushotham A, Møller H, Gallagher JE. A surgeon led smoking cessation intervention in a head and neck cancer centre. *BMC Health Serv Res*. 2014;14(1):636. doi:10.1186/s12913-014-0636-8

30. Papadakis S, McDonald P, Mullen KA, Reid R, Skulsky K, Pipe A. Strategies to increase the delivery of smoking cessation treatments in primary care settings: a systematic review and meta-analysis. *Prevent Med*. 2010;51(3):199-213. doi:10.1016/j.ypmed.2010.06.007

31. Papadakis S, Girvalaki C, Vardavas C, Pipe A, Lionis C. 5As (ask, advise, assess, assist, arrange) tobacco treatment delivery in primary care settings in Greece. *Eur Respir J*. 2016;48(suppl 60). doi:10.1183/13993003.congress-2016.PA4314

32. Thrul J, Vijayaraghavan M, Kalkhoran S, Satterfield JM. Patterns of cigarette, e-cigarette, and cannabis use among adult smokers in primary care 2014-2015. *Addict Behav*. 2020;100:106109. doi:10.1016/j.addbeh.2019.106109

33. Simmons VN, Litvin EB, Unrod M, Brandon TH. Oncology healthcare providers' implementation of the 5A's model of brief intervention for smoking cessation: patients' perceptions. *Patient Educ Couns*. 2012;86(3):414-419. doi:10.1016/j.pec.2011.06.016

34. Warren GW, Dibaj S, Hutson A, Cummings KM, Dresler C, Marshall JR. Identifying targeted strategies to improve smoking cessation support for cancer patients. *J Thorac Oncol*. 2015;10(11):1532-1537. doi:10.1097/JTO.0000000000000659

35. Rojewski AM, Bailey SR, Bernstein SL, et al. Considering systemic barriers to treating tobacco use in clinical settings in the United States. *Nicotine Tob Res*. 2018;21(11):1453-1461. doi:10.1093/ntr/nty123