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Smoking behavior and beliefs about the impact of smoking on anti-tuberculosis treatment among health care workers

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SUMMARY

SETTING—Tuberculosis (TB) health care facilities throughout Georgia.

OBJECTIVE—To describe smoking behaviors among health care workers (HCWs) at TB facilities and determine HCWs' knowledge and beliefs regarding the impact of tobacco use on anti-tuberculosis treatment.

DESIGN—Cross-sectional survey from May to December 2014 in Georgia. Adult HCWs (age ≥ 18 years) at TB facilities were eligible. We administered a 60-question anonymous survey about tobacco use and knowledge of the effect of smoking on anti-tuberculosis treatment.

RESULTS—Of the 431 HCWs at TB facilities who participated, 377 (87.5%) were female; the median age was 50 years (range 20–77). Overall, 59 (13.7%) HCWs were current smokers and 35 (8.1%) were past smokers. Prevalence of current smoking was more common among physicians than among nurses (18.6% vs. 7.9%, $P < 0.0001$). Among HCWs, 115 (26.7%) believed smoking does not impact anti-tuberculosis treatment, and only 25.3% of physicians/nurses received formal training in smoking cessation approaches. Physicians who smoked were significantly more likely to believe that smoking does not impact anti-tuberculosis treatment than non-smoking physicians (aOR 5.11, 95%CI 1.46–17.90).

CONCLUSION—Additional education about the effect of smoking on TB treatment outcomes is needed for staff of TB health care facilities in Georgia. Nurses and physicians need more training about smoking cessation approaches for patients with TB.

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MJM and LD contributed equally to this article.

Keywords

smoking; tobacco; HCW; TB

In 2015, there were an estimated 10.4 million cases of tuberculosis (TB) disease, and 1.5 million deaths due to TB worldwide.[1] Globally, there are an estimated 1 billion tobacco smokers, of whom nearly 80% reside in low- and middle-income countries where the TB burden is greatest.[2] Smoking tobacco is a well-established risk factor for TB. Meta-analyses estimate that smoking doubles the risk of TB disease and TB mortality and is associated with tuberculous infection and TB relapse.[3–5]

Among patients without TB, there is substantial evidence to demonstrate that behavioral and pharmacotherapeutic smoking cessation interventions delivered by health care workers (HCWs) are an effective way of reducing smoking-associated morbidity.[6,7] Clinical guidelines are widely available to provide HCWs with empirically identified best practices to assist with smoking cessation.[8–10] Evidence also suggests that smokers may be more receptive to HCWs' advice to stop smoking when it is linked to an existing medical condition.[11,12] Patients with TB may be highly motivated to quit smoking, given the negative impact of smoke inhalation on TB symptoms.[13,14]

Although standard TB case management provides a key opportunity for patients to receive smoking cessation support,[15,16] little is known about HCW practices at TB facilities with respect to providing smoking cessation recommendations. Despite the recognized need for effective smoking cessation programs tailored to patients with TB,[17–19] few interventions have been evaluated,[19–21] and to date none have been evaluated using randomized trials.[22] Studies that assessed the role of HCWs in assisting patients with TB to cease smoking demonstrated low or no participation in cessation efforts and limited knowledge about smoking cessation options or the impact of smoking on TB outcomes.[19,23]

In 2015, the country of Georgia (population 3.7 million) had a TB incidence of 99 per 100 000 population.[1,24] The 2014 adult prevalence of tobacco smoking in Georgia was estimated at 55.5% among males and 4.8% among females;[2] the prevalence of smoking among patients with TB was estimated to be 55.1% among males and 14.2% among females.[25] Although Georgia has a high burden of TB and tobacco use, little is known about smoking behaviors or smoking cessation knowledge among HCWs providing care for patients with TB. In the context of limited information on the role of HCWs and provision of smoking cessation assistance for patients with TB, we conducted a study among HCWs at TB treatment facilities in the country of Georgia. The objectives of our study were to measure the prevalence and patterns of smoking among HCWs at TB treatment facilities and to determine the knowledge and beliefs regarding the impact of smoking on TB treatment outcomes.

STUDY POPULATION AND METHODS

Setting and participants

We conducted a cross-sectional study among HCWs at TB treatment facilities in Georgia from May to December 2014. All staff aged ≥ 18 years employed at TB treatment facilities in Georgia, including the National Center for Tuberculosis and Lung Diseases (Tbilisi, Georgia) and affiliated regional clinics that are also part of the Georgian National TB Program, were eligible to participate. Study staff invited HCWs and other treatment facility staff at these TB health care facilities to participate in an anonymous self-administered 60-question survey about tobacco smoking opinions and behaviors. Before enrollment, the participants received information about the study's objectives and procedures, had the opportunity to ask questions about the study, and provided verbal consent.

Measures

The survey included questions adapted from the Global Adult Tobacco Survey,[26] the Global Health Professionals Survey,[27] and previously published studies[28–30] that assessed smoking behavior and attitudes among health care professionals (see Appendix* for the complete survey). Briefly, the survey asked participants to self-report demographics and employment position at the TB facility, current and past smoking behaviors, and attitudes and beliefs about the role of smoking on anti-tuberculosis treatment. HCWs providing patient care (physicians, nurses and nursing staff) were also asked additional questions about training received, knowledge, and beliefs related to smoking and smoking cessation.

Current smokers were defined as those who self-reported ever smoking a cigarette, who had smoked at least 100 cigarettes, and reported currently smoking tobacco.[31] Past smokers were defined as those who self-reported ever smoking a cigarette, who had smoked at least 100 cigarettes, but reported not currently smoking. Participants who self-reported not ever smoking a cigarette were defined as non-smokers. Current smokers were asked additional questions about smoking frequency (cigarettes per day), attempts to cease smoking in the past year, and other questions to characterize their smoking.

Participants were asked if they thought smoking impacts the prognosis for TB and if they thought smoking reduces the effectiveness of anti-tuberculosis treatment; those responding 'yes' to either question were defined as believing smoking negatively impacts TB treatment. HCWs responded to multiple Likert scale questions about smoking and smoking cessation related beliefs; those responding 'agree' or 'strongly agree' were defined as affirming the belief.

Statistical analyses

All study data were collected on a paper survey form, entered into a REDCap[32] database (Research Electronic Data Capture, Vanderbilt University, Nashville, TN, USA) by study staff, and analyzed using SAS version 9.4 (Statistical Analysis System, Cary, NC, USA). We

*The appendix is available in the online version of this article, at http://www.ingentaconnect.com/content/iuatld/ijtld/2017/00000021/00000009/art00017

used bivariate analyses to examine the associations between 1) participant demographics and current smoking status, 2) specific smoking behaviors and age group and 3) smoking knowledge/beliefs and health care employment position. To determine statistical significance in bivariate analyses, the χ^2 test was used for categorical variables and a Kruskal-Wallis or Wilcoxon rank-sum test for continuous variables. We used logistic regression to compare the odds of believing that smoking does not impact anti-tuberculosis treatment by current smoking status. The a priori hypothesis that the effect of current smoking status on the belief that smoking does not impact anti-tuberculosis treatment would differ across health care employment position (physician/nurse) was examined; we assessed this interaction using prevalence differences and logistic models. For interaction assessment, smoking status was dichotomized as current smoker vs. past smoker and non-smoker combined. A two-sided $P < 0.05$ was considered statistically significant in all analyses.

Ethical review

The study was reviewed and approved by the institutional review boards of Emory University, Atlanta, GA, USA, and the National Center for Tuberculosis and Lung Diseases, Tbilisi, Georgia.

RESULTS

During the study period, 471 HCWs from 11 TB treatment facilities throughout the country of Georgia were invited to participate, of whom 431 (91.5%) were enrolled in the study. Most participants were female ($n = 377$, 87.5%), reflecting the distribution of HCWs in Georgia; were employed as a nurse or nurse staff ($n = 202$, 46.9%); and resided in an urban setting ($n = 392$, 91.0%) (Table 1). The median age was 50 years (interquartile range [IQR] 40–57), and the median years of education was 14 (IQR 12–16).

The overall prevalence of current smoking among HCWs at TB facilities was 13.7% (95% confidence interval [CI] 10.7–17.2), and 8.1% (95%CI 5.8–11.0) reported past smoking (Table 1). Current smoking was significantly more common among males than females (46.3% vs. 9.0%), among physicians than nurses (18.6 vs. 7.9%), and among those employed in an administrative position than among all other positions (31.0% vs. 11.0%, $P < 0.0001$ for all three comparisons). The median years of education was greater among smokers (15, IQR 12–16) than among non-smokers (13, IQR 12–16, $P < 0.01$). Compared to non-smokers, current smokers were more likely to report that smoking was permitted in their home (18.6% vs. 5.6%) and car (16.9% vs. 1.5%, $P < 0.0001$).

Among 59 HCWs at TB facilities who reported current smoking, the self-reported median age at first smoking regularly was 22 years (IQR 19–26), and the median number of cigarettes smoked per day was 15 (IQR 8–20). Half ($n = 30$, 50.9%) of the current smokers reported attempting to quit smoking in the past year; the median number of attempts among those who attempted was two (IQR 1–5). In addition, 56.0% ($n = 33$) of current smokers reported that they expected to quit in the distant future.

Among 431 HCWs employed at the Georgian TB facilities, 115 (26.7%) reported believing that smoking does not impact TB treatment outcome (Table 2). In multivariable analysis,

HCWs aged ≤50 years were significantly more likely to believe that smoking does not impact anti-tuberculosis treatment than those aged ≥51 years (adjusted odds ratio [aOR] 1.66, 95%CI 1.05–2.62). When age was categorized as 20–40 years vs. ≥41 years, the association between age and belief that smoking does not impact anti-tuberculosis treatment increased (aOR 2.11, 95%CI 1.02–4.37, data not shown). Compared to non-smokers, current smokers were non-significantly more likely to believe that smoking does not impact anti-tuberculosis treatment (aOR 1.39, 95%CI 0.71–2.72).

In interaction assessment, physicians who were current smokers were significantly more likely than non/past smokers to believe that smoking does not impact anti-tuberculosis treatment (prevalence difference 26.7%, 95%CI 0.7–52.5), while among nurses there was little difference in belief by smoking status (prevalence difference 0.6%, 95%CI −23.1 to 24.3) (Table 3). In multivariable analysis adjusted for age, sex, and years of education, a similar difference in belief that smoking does not impact anti-tuberculosis treatment by smoking status was observed among physicians (aOR 5.11, 95%CI 1.46–17.90) but not nurses (aOR 1.00, 95%CI 0.32–3.08). Statistical tests for heterogeneity of smoking status by employment type in multivariable analysis were non-significant ($P = 0.06$).

Of the 288 HCWs with patient contact (physicians and nurses), a low proportion ($n = 73$, 25.3%) had received formal training in smoking cessation approaches (Table 4). Physicians were significantly more likely to be aware of antidepressant pharmacotherapy for smoking cessation than nurses (38.4% vs. 16.8%, $P < 0.0001$); however, physicians were less likely than nurses to know of community resources available to help patients with TB stop smoking (37.2% vs. 50.5%, $P = 0.04$). A significantly lower proportion of physicians than nurses believed smoking increases the required duration of anti-tuberculosis treatment (57.0% vs. 76.2%, $P = 0.001$), but nearly all physicians (95.4%) and nurses (96.0%) believed HCWs should routinely advise patients with TB to cease smoking.

DISCUSSION

We found that 13% of HCWs employed at TB treatment facilities in the country of Georgia were current smokers, including nearly half of male physicians. More than 25% of 431 HCWs at 11 TB facilities in Georgia erroneously believed that smoking does not impact TB treatment outcomes, and this belief was significantly more common among younger HCWs. We also found that the effect of smoking status impacted beliefs about TB treatment outcomes. In multivariable analysis, physicians who currently smoked were five times more likely to report that smoking does not impact anti-tuberculosis treatment than non-smoking physicians. Targeted education and smoking cessation programs for HCWs at TB treatment facilities may provide numerous benefits, for preserving the health of HCWs and patients, improving TB treatment outcomes, and increasing quality of life throughout the course of their lives.

The prevalence of current smoking reported by HCWs working at TB treatment facilities in our study was comparable to the estimated national prevalence of smoking in Georgia. For example, 2012–2014 national estimates of smoking prevalence in Georgia were 53–56% among males and 5–6% among females.[2,33] In our study of HCWs at TB facilities, 46% of

males and 9% of females reported current smoking. It is to be noted that smoking prevalence among HCWs at TB facilities in Georgia was similar to that among patients with TB (55% among males and 14% among females). We suggest that non-smoking HCWs who believe that smoking impacts anti-tuberculosis treatment and serve as role models are likely to be better suited to support smoking cessation efforts of patients with TB.

Studies have not previously surveyed HCWs at TB facilities about smoking behaviors or beliefs about smoking cessation in the context of anti-tuberculosis treatment. Our study enrolled 431 HCWs from TB facilities in various regions of Georgia and surveyed several different types of health care employees. One previous qualitative focus group study of 17 TB physicians from Beijing, China, reported that some TB physicians doubted that smoking affected TB.[23] We reported that 22% of TB physicians believed that smoking does not impact anti-tuberculosis treatment and that compared to non-smoking physicians, current smoking physicians were more than five times as likely to believe that smoking does not impact TB treatment. The study from Beijing also reported that physicians who also smoked did not believe smoking cessation to be an integral part of anti-tuberculosis treatment. It is probable that patients with TB who receive care from physicians who do not believe smoking impacts anti-tuberculosis treatment will have a reduced likelihood of smoking cessation during treatment. Because patients with TB who do not cease smoking are at increased risk of TB failure and death,[3,5] it is imperative that TB physicians understand the impact of smoking on treatment and support patients to quit smoking.

Our results suggest that training HCWs (specifically physicians and nurses) at these TB facilities about available clinical guidelines for smoking cessation would be beneficial. Previous international recommendations to assign specific HCWs to provide tobacco and smoking cessation interventions as part of TB case management would be a testable and feasible intervention for TB health care facilities in Georgia.[15] In addition, our finding that HCWs aged ≤40 years were more than twice as likely to believe smoking does not impact anti-tuberculosis treatment suggests that training related to the negative effects of smoking should be developed to specifically engage younger HCWs. While all HCWs likely need smoking cessation-related training, instruction methods and materials may need to be tailored differently according to the age of the HCWs. Effective training of health care providers on the clinical practice guidelines for smoking cessation may significantly increase rates of patients' quitting and in turn, improve TB cure rates.[34] Preparing a willing and informed health care staff to deliver TB smoking cessation interventions requires that workers view the activity as essential, understand and believe they should provide the cessation intervention, are trained about how to perform the intervention tasks, and have confidence in their ability to deliver the recommended cessation assistance.[15,35]

Our study was subject to limitations. First, because participation in the survey was anonymous, it was not possible to determine the proportion of HCWs at each TB facility who enrolled. Nonetheless, to our knowledge, our study among 431 physicians, nurses, and other facility staff is the largest to assess smoking behaviors and beliefs among HCWs at TB facilities. Furthermore, our study included 11 geographically diverse TB facilities; we therefore believe our findings are generalizable to HCWs at TB facilities throughout Georgia. Second, as potential participants were informed of the study's focus on smoking,

this may have influenced HCW participation. However, we believe that because the study survey was anonymous, HCWs who smoked were more likely to report their smoking behaviors. Moreover, the reported prevalence of current smoking among TB HCWs was consistent with national estimates of smoking from the country of Georgia.

CONCLUSIONS

Education about the negative impact of smoking on TB outcomes should be provided to all HCWs at TB facilities in Georgia, including physicians and nurses. HCWs at TB facilities with patient contact should receive training about smoking cessation interventions. Such interventions should be offered to patients with TB and to HCWs who smoke.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

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Table 1

Smoking status and demographic characteristics among HCWs at tuberculosis treatment facilities from the country of Georgia

HCW characteristic	Total (*n* = 431) *n* (%)	Current smoker (*n* = 59, 13.7%) *n* (%)	Past smoker (*n* = 35, 8.1%) *n* (%)	Non-smoker (*n* = 337, 78.2%) *n* (%)	*P* value*
Sex					
Male	54 (12.5)	25 (46.3)	11 (20.4)	18 (33.3)	< 0.0001†
Female	377 (87.5)	34 (9.0)	24 (6.4)	319 (84.6)	
Age, years, median [IQR]	50 [40–57]	49 [38–56]	44 [37–57]	50 [41–58]	0.30
Residence, urban	392 (91.0)	51 (13.0)	32 (8.2)	309 (78.8)	0.43
Employee category					
Nurse/nurse staff	202 (46.9)	16 (7.9)	9 (4.5)	177 (87.6)	
Physician	86 (20.0)	16 (18.6)	12 (14.0)	58 (67.4)	< 0.0001†
Laboratory/research staff	45 (10.4)	6 (13.3)	5 (11.1)	34 (75.6)	
Administrative staff	58 (13.5)	18 (31.0)	6 (10.3)	34 (58.6)	
Other‡	40 (9.3)	3 (7.5)	3 (7.5)	34 (85.0)	
Education, years, median [IQR]	14 [12–16]	15 [12–16]	15 [13–17]	13 [12–16]	0.0068†
Smoking permitted in home	35 (8.1)	11 (31.4)	5 (14.3)	19 (54.3)	< 0.0001†
Smoking permitted in car	19 (4.4)	10 (52.6)	4 (21.1)	5 (26.3)	< 0.0001†
Smoke-free policy at work	233 (54.1)	31 (13.3)	24 (10.3)	178 (76.4)	0.19
Public smoke exposure§	174 (40.4)	27 (15.5)	19 (10.9)	128 (73.6)	0.57

*Two-sided general χ^2 *P* value for categorical variables and two-sided Kruskal-Wallis test for continuous variables.

†Statistically significant.

‡Included medical/nursing student, security staff, or information technology staff.

§Self-reported exposure to second-hand smoke on a daily basis.

HCW = health care worker; IQR = interquartile range.

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Table 2

Belief that smoking does not impact anti-tuberculosis treatment among HCWs at TB treatment facilities in the country of Georgia

	Smoking negatively impacts anti-tuberculosis treatment (*n* = 316, 73.3%) *n* (%)	**Smoking does not impact anti-tuberculosis treatment (*n* = 115, 26.7%) *n* (%)**	**OR (95%CI)***	**aOR (95%CI)*†**
Sex, male vs. female	38 (70.4)	16 (29.6)	1.18 (0.63–2.22)	1.57 (0.74–3.34)
Age, years				
20–50	164 (68.9)	74 (31.1)	1.67 (1.08–2.60)‡	1.66 (1.05–2.62)‡
51–77	152 (78.8)	41 (21.2)	Reference	Reference
Residence, urban vs. rural	287 (73.2)	105 (26.8)	1.06 (0.50–2.25)	1.21 (0.56–2.64)
Employee category				
Nurse/nurse staff	140 (69.3)	62 (30.7)	1.77 (0.77–4.06)	1.65 (0.65–4.15)
Physician	67 (77.9)	19 (22.1)	1.13 (0.45–2.87)	1.33 (0.51–3.50)
Laboratory/research staff	31 (68.9)	14 (31.1)	1.81 (0.67–4.91)	1.94 (0.70–5.41)
Administrative	46 (79.3)	12 (20.7)	1.04 (0.38–2.84)	0.82 (0.28–2.39)
Other§	32 (80.0)	8 (20.0)	Reference	Reference
Education, years				
≤11	53 (71.6)	21 (28.4)	1.29 (0.71–2.40)	1.28 (0.62–2.66)
12–14	113 (70.2)	48 (29.8)	1.39 (0.86–2.22)	1.40 (0.74–2.66)
≥15	150 (76.5)	46 (23.5)	Reference	Reference
Smoking status				
Current smoker	40 (67.8)	19 (32.2)	1.37 (0.75–2.48)	1.39 (0.71–2.72)
Past smoker	26 (74.3)	9 (25.7)	1.00 (0.45–2.21)	0.97 (0.42–2.25)
Non smoker	250 (74.2)	87 (25.8)	Reference	Reference

*Logistic regression was used to estimate the odds of reporting that smoking does not impact anti-tuberculosis treatment.

†Multivariable logistic regression including all variables in the table.

‡Statistically significant.

§Included medical/nursing student, security staff, or information technology staff.

HCW = health care worker; OR = odds ratio; CI = confidence interval; aOR = adjusted OR

Table 3

Interaction between current smoking status and employment position with the belief that smoking does not impact anti-tuberculosis treatment

	Prevalence of the belief that smoking does not impact anti-tuberculosis treatment, *n*/*N* (%)	
	Physician (*n* = 86)	**Nurse (*n* = 202)**
Current smoker	7/16 (43.8)	5/16 (31.3)
Non/past smoker	12/70 (17.1)	57/186 (30.7)
Prevalence difference, % (95%CI)	26.7 (0.7–52.5)	0.6 (−23.1 to 24.3)
	aOR (95%CI) *	
Current smoker	5.11 (1.46–17.90)	1.00 (0.32–3.08)
Non/past smoker	Reference	Reference

* Multivariable model was adjusted for employment position, age, sex, and years of education.

aOR = adjusted odds ratio; CI = confidence interval.

Table 4

Training experience related to smoking and smoking-related beliefs among HCWs at TB treatment facilities with regular patient contact in the country of Georgia

	Physicians (*n* = 86, 29.9%) *n* (%)	Nurses (*n* = 202, 70.4%) *n* (%)	*P* value*
Training received and knowledge related to smoking:			
Taught about dangers of smoking	47 (54.7)	84 (41.6)	0.04†
Discussed in training why people smoke	49 (57.0)	100 (49.5)	0.25
Taught to record smoking history in medical record	62 (72.1)	124 (61.4)	0.08
Taught formal smoking cessation approaches	19 (22.1)	54 (26.7)	0.41
Taught to provide smoking cessation materials	42 (48.8)	86 (42.6)	0.33
Aware of nicotine replacement therapy (patch or gum)	61 (70.9)	124 (61.4)	0.12
Aware of antidepressants in tobacco cessation programs	33 (38.4)	34 (16.8)	< 0.0001†
Know of resources to help patients quit	32 (37.2)	102 (50.5)	0.04†
Ever heard of electronic cigarettes	76 (88.4)	NA	
Patients ever asked about using electronic cigarettes to quit	46 (53.4)	NA	
HCWs agree/strongly agree with smoking-related beliefs:			
Smoking increases TB treatment duration	49 (57.0)	154 (76.2)	0.001†
Smoking should be banned in TB hospitals	72 (83.7)	170 (84.2)	0.93
HCWs get training on smoking cessation	70 (81.4)	170 (84.2)	0.56
HCWs are role models for their patients	76 (88.4)	191 (94.6)	0.06
HCWs should routinely advise patients to cease smoking	82 (95.4)	194 (96.0)	0.79
HCWs can improve patient's chance of smoking cessation	55 (64.0)	121 (59.9)	0.52
HCWs who smoke are less likely to advise patients to quit	46 (53.5)	83 (41.1)	0.05

*Two-sided general χ^2.

†Statistically significant.

HCW = health care worker; TB = tuberculosis; NA = not available.