Knowledge of and attitudes toward the WHO MPOWER policies to reduce tobacco use at the population level: a comparison between third-year and sixth-year medical students

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ABSTRACT

Objective: To evaluate third- and sixth-year medical students in Brazil in terms of their knowledge of and attitudes toward the WHO MPOWER policies to reduce tobacco use. **Methods:** The WHO Global Health Professions Student Survey was applied in five cohorts of medical students evaluated in their third and sixth years of medical school, between 2008 and 2015. Comparisons were drawn between the two years of medical school in terms of the proportions of students who experimented with or used tobacco products in the last 30 days prior to the survey; knowledge of and compliance with smoke-free policies on the university campus; formal training on smoking cessation strategies; and self-recognition as role models for patients/society. **Results:** Of the 943 students who completed the survey, approximately 6% had smoked cigarettes in the last 30 days prior to the survey. Comparing the third and sixth years of medical school, we observed a significant increase in the proportion of students who were knowledgeable about smoking cessation strategies (22.74% vs. 95.84%; p < 0.001) and in that of those who recognized their role as models for patients/society (84.5% vs. 89.7%; p = 0.023). Student knowledge of the smoking policies on the university campus was associated with an increase in self-recognition as role models (adjusted absolute difference = 6.7%; adjusted p = 0.050). **Conclusions:** Knowledge of smoking cessation strategies and self-recognition as role models for patients/society increase over the course of medical school and are associated with the implementation of smoke-free policies.

Keywords: World Health Organization; Education, public health professional; Students, medical; Tobacco; Capacity building; Health behavior.

INTRODUCTION

Every year, tobacco use kills more than 8 million people worldwide.[1] In 2008, the WHO Framework Convention on Tobacco Control drafted six key policies to reduce demand for tobacco products. These measures are known as MPOWER, an acronym for the following recommendations: **M**onitor tobacco use and prevention policies; **P**rotect people from tobacco smoke; **O**ffer help to quit; **W**arn about the dangers of tobacco; **E**nforce bans on tobacco advertising, promotion, and sponsorship; and **R**aise taxes on tobacco.[2]

The seventh WHO Report on the Global Tobacco Epidemic,[3] launched in Brazil in July of 2019, was a milestone for tobacco control policies in the country. On that occasion, Brazil was recognized as the second country in the world to implement, at the highest level, all of the measures contained in the MPOWER package.

Most smokers want to quit, and the chance of cessation increases with health professionals offering help to quit tobacco use (behavioral and/or pharmacological approach). Offering help to quit smoking is a cost-effective population-based intervention.[3,4] The WHO report emphasized the need to expand the **O**ffer policy, by making more smoking cessation facilities available as an essential component of any tobacco control strategy.[3] Moreover, the WHO report highlighted that when offering help to quit smoking comes together with other tobacco control strategies, such as tax raises and smoking bans, that policy has a greater impact.[3]

In order to continue expanding the smoking treatment network, apart from increasing the availability of pharmacological therapy, ongoing attention to the formal training of future health professionals on smoking cessation approaches is necessary.[5-7] In this sense,

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we assume that if medical students are aware of the benefits of smoking cessation, they will be more likely to avoid smoking themselves and will act as role models for their patients.[8]

The present study aimed to evaluate medical students in Brazil in terms of their knowledge of and attitudes toward the WHO MPOWER policies to reduce tobacco use in the population, over the course of medical school. Therefore, third- and sixth-year medical students completed the WHO Global Health Professions Student Survey (GHPSS).[9]

METHODS

This was a prospective cohort study conducted among undergraduate third- and sixth-year medical students at the University of São Paulo School of Medicine, located in the city of São Paulo, Brazil. Information about the objectives of the current study was provided in the classroom by the authors responsible for the study. Students signed an informed consent form and then completed the WHO GHPSS.[9] The survey has been translated into Portuguese and validated for use in Brazil.[10,11]

Third-year medical students completed the survey in June of 2008-2012. Those third-year medical students, when they were in their sixth year of medical school (i.e., between 2011 and 2015), were invited to complete the same survey again, which created five student cohorts to be followed. In addition, we collected the answers of the sixth-year students who were not in the classroom in their third year of medical school when the survey had been applied in the previous years. It is important to mention that, of a total of 175 third-year students enrolled in the medical school annually between 2008 and 2012 (N = 875), 556 (63.5%) completed the survey. Of the sixth-year medical students, 110, 61, 82, 66, and 68 completed the survey in 2011, 2012, 2013, 2014, and 2015, respectively, totaling 387 (44.2%) of the total number of enrolled students (N = 875). Moreover, 203 (36.5%) of the third-year students were successfully followed up over the study period.

For descriptive statistical analysis, we selected the following variables related to the current and future implementation of the MPOWER policies at the university—**M**onitor: prevalence of cigarette use, proportion of experimentation with other forms of tobacco (chewing tobacco, snuff, bidis, cigars, or pipes), and proportion of experimentation with water pipes[12]; **P**rotect: protecting people from tobacco smoke was analyzed by the dichotomous variable related to the perception of the enforcement of smoking ban in the university ("Does your school have an official smoking ban policy in school buildings and clinics?" and "Is your school's official smoking ban in school buildings and clinics enforced?"); **O**ffer: students who reported having received formal training on smoking cessation strategies ("Have you received any formal training to address the issue of smoking

cessation with patients at the medical school?"); and self-recognition as role models for patients/society ("Do you recognize yourself as a role model for your patients and the population?").[13,14]

For all descriptive statistical analyses, the chi-square test was used in order to compare the corresponding proportions between medical school years among all third- and sixth-year medical students who completed the survey. We also considered a secondary analytical sample for descriptive analyses that consisted of students who were successfully followed up over time (36.5% of the third-year students) in order to control for unmeasured characteristics that might otherwise confound the results. Moreover, among the students who were not lost to follow-up, in order to assess a possible mechanism to explain the relationship between school year and student perception of their role as models for patients/society (Figure 1), the differences in the proportion between third- and six-year medical students who answered "yes" to the question "Do you recognize yourself as a role model for your patients and the population?" were simultaneously adjusted for demographic and socioenvironmental variables. Because the response variable was dichotomous (i.e., yes or no), and given the public health implications of our study, crude absolute differences in the proportions were obtained from a generalized linear model using the binomial family and Gaussian link function.[15,16] Overall differences by medical school year in the proportions of the "role model" variable were simultaneously adjusted for age, smoking status, and the "smoking ban" variable (model A); then, we also added to the model the selected question about the curriculum "Have you received any formal training on how to approach smokers?" (model B); and, finally, we also considered a sensitivity analysis that included the entire baseline sample (third-year students), that is, students who were and were not lost to follow-up.

All analyses were performed with the Stata statistical software package, version 15.0 (StataCorp LP, College Station, TX, USA), and the study was approved by the research ethics committee of the institution (CAPPesq no. 0277/08).

RESULTS

Table 1 shows that there was a higher proportion of males who completed the survey among third-year medical students than among sixth-year students, although that difference was not statistically significant. The mean age of third- and sixth-year medical students was 22.2 years and 24.6 years, respectively. A low proportion of cigarette consumption and a high proportion of experimentation with water pipes were found in both groups.

We found a statistically significant increase in the proportion of medical students who reported having received formal training on smoking cessation approaches (22.7% in the third-year group vs. 95.8%

in the sixth-year group), as well as in the perception of compliance with the environmental tobacco smoke control policy inside university buildings/hospitals (59.3% vs. 69.0%). Detailed information on the proportion of students who stated that the smoking ban in school buildings and clinics is enforced can be found in the supplementary material.

The proportion of affirmative answers to the question regarding self-recognition as role models for patients/society was high in both groups, being higher in the sixth-year-student group (89.7% vs. 84.5%). Additional descriptive analyses, such as the prevalence of use of and experimentation with other forms of tobacco (stratified by sex), as well as the attitudes toward, beliefs about, and knowledge of such products, can be found in the supplementary material.

Table 2 shows that the proportion of males, the proportion of experimentation with water pipes, and the mean age of third-year medical students who were lost to follow-up were significantly higher than were those observed among students who were successfully followed-up. However, both subgroups showed similar proportions of smokers and answered similarly the questions regarding formal training, perception of smoking ban, and self-recognition as role models. Moreover, comparisons regarding demographic data, smoking status, and selected answers to the WHO GHPSS between third- and sixth-year medical students who were successfully followed up revealed similar results to those found for the overall sample of third- and sixth-year medical students who completed the survey (Table 1).
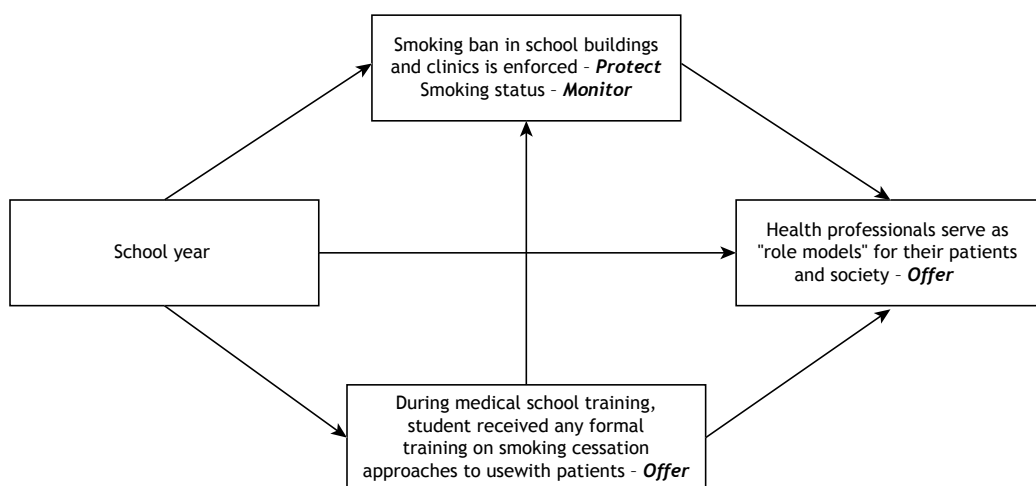

Figure 1. Schematic representation of the mechanisms to explain the relationship between school year and the research questions of interest.

Table 1. Demographic data, smoking status, and selected answers to the WHO Global Health Professions Student Survey of third-year medical students (2008-2012) and sixth-year medical students (2011-2015). University of São Paulo School of Medicine, Brazil.[a]

Variable	School year				p	Adjusted p*
	Third		Sixth			
	N = 556		N = 387			
Male	321	(57.7)	213	(55.5)	0.49	N/A
Tobacco use (**M**onitor)[b]						
Cigarette smoking	30	(5.4)	26	(6.7)	0.40	0.57
Experimentation with other forms of tobacco[c]	117	(21.0)	92	(23.8)	0.35	0.94
Experimentation with water pipe	241	(43.3)	168	(43.8)	0.83	0.90
University/curriculum (**O**ffer)[b]						
Received any formal training on smoking cessation approaches	126	(22.7)	369	(95.8)	< 0.001	N/A
University/passive smoking (**P**rotect)[b]						
Smoking ban in school buildings and clinics is enforced	326	(59.3)	265	(69.0)	< 0.002	N/A
Health professionals/attitude (**O**ffer)[b]						
Recognize yourself as a role model for patients and the general population	464	(84.5)	347	(89.7)	0.023	N/A

[a]Values expressed as n (%). [b]In accordance with WHO MPOWER policies. [c]Except water pipe. *The overall difference by school year in the prevalence of smoking (or tobacco use) was simultaneously adjusted for age and sex.

Table 3 shows that there was an increase in student perception of being role models (regarding smoking) for patients/society from the third to the sixth year of medical school (crude absolute difference = +6.9%), although that increase was not found when the statistical model was adjusted for other demographic and socioenvironmental variables. Model B suggests that the effect of the school year was primarily mediated by having received formal training on smoking cessation strategies (crude absolute difference = +6.4%). The variable "having knowledge of the compliance with the smoking ban policy on the university campus" was also associated with an increase (crude and adjusted absolute difference) in student perception of being role models for patients and the general population.

We included the entire sample of third-year medical students in the sensitivity analysis (Table 4), and the main conclusions based on Table 3 remained unaltered.

DISCUSSION

From 2008 to 2015, the present study monitored third- and sixth-year medical students at the University of São Paulo School of Medicine on various issues related to smoking, and it revealed that the academic/university environment had a positive and transforming impact on those students.

Sixth-year medical students reported a significant increase in their knowledge of the approach to smoking treatment and in their perception of their role as behavioral models for patients/society, when compared with third-year students (MPOWER Offer strategy).

Formal training on smoking cessation approaches probably had an impact on the increase in self-efficacy and expanded the repertoire of the students on topics related to smoking cessation to be used with smokers in the future (MPOWER Offer strategy). A study involving medical students from Finland revealed that the lack of ability to address smokers appropriately during a clinical consultation stems from the lack of specific training.[13] Moreover, a study conducted in Iraq found that physicians who were smokers and reported having received formal training on smoking cessation during their university education recognized that they could have a more positive impact on the population if they quit smoking.[14] Formal education obtained during the years of medical training is, therefore, essential for the transformation and development of the student into a medical role model, insofar as the vision of his/her role in society expands.[17] Another important point is that the concept that students have of themselves evolves as they come into contact with patients and accumulate more knowledge, feel more confident, and have a greater professional identity.[18,19]

Article 14 of the WHO Framework Convention on Tobacco Control[20] strengthens the importance of reducing the number of current tobacco users through teaching about the treatment of tobacco dependence. One of WHO's global monitoring frameworks for the noncommunicable disease action plan is to reduce tobacco use. To achieve that goal, medical schools

Table 2. Demographic data, smoking status, and selected answers to the WHO Global Health Professions Student Survey of third-year medical students (lost and not lost to follow-up subgroups) and sixth-year medical students (not lost to follow-up). University of São Paulo School of Medicine, Brazil.[a]

Variable	School year		
	Third (2008-2012)[c,d]		Sixth (2011-2015)[d]
	Lost to follow-up n = 353	Not lost to follow-up n = 203	Not lost to follow-up n = 203
Demographic			
Male	62.0%	50.3%	50.3%
Mean age, years	22.5	21.8	24.5
Tobacco use (Monitor)[a]			
Cigarette smoking	5.7%	4.9%	5.9%
Experimentation with other forms of tobacco[b]	23.1%	18.0%	17.3%
Experimentation with water pipe	49.7%	33.3%	33.7%
University/curriculum (Offer)[a]			
Received any formal training on smoking cessation approaches	24.4%	19.8%	95.1%
University/passive smoking (Protect)[a]			
Smoking ban in school buildings and clinics is enforced	61.3%	55.7%	63.4%
Health professionals/attitude (Offer)[a]			
Recognize yourself as a role model for patients and the general population	84.7%	84.2%	91.1%

[a]In accordance with WHO MPOWER policies. [b]Except water pipe. [c]Statistically significant differences between the subgroups are indicated as follows: male (p = 0.007); age (p = 0.009); and water pipe experimentation (p < 0.001; p adjusted for sex and age = 0.15), [d]Statistically significant differences between school years among students who were not lost to follow-up are indicated as follows: age (p < 0.001); Offer policy (p < 0.001); and role model (p = 0.033).

Table 3. Crude and adjusted absolute differences in student self-recognition as role models for patients/society among medical students who were successfully followed up, by school year, demographic variable, and socioenvironmental variable.

Variable	CAD[a]		Model A[b] AAD[a]		Model B[c] AAD[a]	
	%	p	%	p	%	p
School year						
Third	Ref		Ref			
Sixth	6.9	0.03	6.3	0.09	1.9	0.70
Sex						
Female	Ref		–	–	–	–
Male	−3.0	0.34	–	–	–	–
Age, years	0.9	0.10	−0.1	0.89	−0.1	0.87
Smoking status						
Nonsmoker	Ref		Ref		Ref	
Smoker	−11.0	0.23	−11.7	0.18	−11.5	0.19
Received any formal training on smoking cessation approaches						
No	Ref		–	–	Ref	
Yes	7.9	0.02	–	–	+6.4	0.14
Smoking ban in school buildings and clinics is enforced						
No	Ref		Ref		Ref	
Yes	7.9	0.02	6.6	0.05	6.7	0.05

CAD: crude absolute difference; and AAD: adjusted absolute difference. [a]Generalized linear model using the binomial family and Gaussian link function. The regression coefficient was the absolute difference in proportions. [b]The overall difference by school year in the proportion of affirmative answers to the question about self-recognition as role models was simultaneously adjusted for age, smoking status, cohort of students, and smoking ban. [c]The overall difference in the proportion of affirmative answers to the question about self-recognition as role models was simultaneously adjusted for age, smoking status, cohort of students, smoking ban, and the question about receiving any formal training on smoking cessation approaches.

Table 4. Crude and adjusted absolute differences in student self-recognition as role models for patients/society among the overall sample of medical students, by school year, demographic variable, and socioenvironmental variable .

Variable	CAD[a]		Model A[b] AAD[a]		Model B[c] AAD[a]	
	%	p	%	p	%	p
School year						
Third	Ref		Ref			
Sixth	6.6	0.009	7.1	0.010	1.6	0.62
Sex						
Female	Ref		-	-	-	-
Male	−2.2	0.39	-	-	-	-
Age, years	0.3	0.099	−0.2	0.69	−0.2	0.79
Smoking status						
Nonsmoker	Ref		Ref		Ref	
Smoker	−8.2	0.21	−8.2	0.19	−8.4	0.18
Received any formal training on smoking cessation approaches						
No	Ref		-	-	Ref	
Yes	5.8	0.049	-	-	6.1	0.075
Smoking ban in school buildings and clinics is enforced						
No	Ref		Ref		Ref	
Yes	6.8	0.011	5.9	0.026	6.0	0.029

CAD: crude absolute difference; and AAD: adjusted absolute difference. [a]Generalized linear model using the binomial family and Gaussian link function. The regression coefficient was the absolute difference in proportions. [b]The overall difference in the proportion of affirmative answers to the question about self-recognition as role models was simultaneously adjusted for age, smoking status, cohort of students, and smoking ban. [c]The overall difference in the proportion of affirmative answers to the question about self-recognition as role models was simultaneously adjusted for age, smoking status, cohort of students, smoking ban, and the question about receiving any formal training on smoking cessation approaches.

will therefore have to do their part in teaching about tobacco control in order to help smokers to quit.[20,21]

At present, smoking cessation treatment involves both behavioral/cognitive counseling (brief or intensive, individual or in group) and pharmacotherapy, and its costs are fully covered to all smokers by the Brazilian Unified Health Care System in primary care facilities or hospitals. In 2019, after a long and arduous process, the National Health Insurance Agency of the Brazilian National Ministry of Health finally approved the inclusion of smoking cessation treatment in private health insurance coverage, benefiting 47 million privately insured people (22% of the total population in Brazil).[22-24]

To the best of our knowledge, this is the first study that evaluated the association between the GHPSS and medical students' self-recognition of their importance as future physicians who will offer their patients help to quit tobacco use and will serve as role models for their patients/society. The reasons for their self-recognition as role models can be a result of a transition process during their medical training, determined not only by formal education methodology but also by socioenvironmental components, such as the smoke-free environment law that came into force in the state of São Paulo in 2009 (MPOWER **P**rotect policy).[12] In fact, the 2019 Report on the Global Tobacco Epidemic[3] emphasizes that when the help to quit smoking comes together with other tobacco control strategies, there is a greater impact.

Our analysis showed that the perception of enforcement of the smoking ban inside the campus (MPOWER **P**rotect policy) also influenced student self-recognition as a model of behavior for patients and the population, regardless of the school year. It is worth mentioning that, in 2009, ninety days prior to the enactment of the Anti-smoking Law[12] that created smoke-free environments and banned the use of any smoking product, derived or not from tobacco, in all public and private enclosed places, the most varied types of communication outlets massively disseminated information about the contents of the law and the necessary changes that should take place.

According to Bandura,[25] the observational paradigm of the process of awareness of becoming a role model is composed of attention, retention, reproduction, and motivation, which in turn is influenced by the behavior, the individual, and the environment. The vast majority of the citizens in the state of São Paulo comply with the smoke-free environment law,[12] which suggests that they understood the benefit of the law for public health. The assessment of students that was conducted between June/July of each year probably revealed the positive impact of a well-conducted public health campaign in the perception of the third- and sixth-year medical students as of 2010. This change in beliefs and behaviors is corroborated by studies conducted in the last decade that demonstrated that disclosure and dissemination of health care knowledge lead to changes in the attitudes of medical professionals and the population in general.[26-29]

The social environmental components, such as the implementation of smoke-free environments in hospital and medical education settings, are important for the development of the student's own image as a future health professional who will serve as a role model for patients and society.[30] A change in the educational environment, such as the enforcement of the smoke-free environment law,[12] should be adopted on a broader scale in the education of medical students as part of the contribution to the construction of a "role model".[31] By means of a cultural change, medical students acquire skills and competences to cope with the new norms and values of his/her community.[8] This concept is known as "community practices"[32] and contributes, together with the years spent in medical school, to the development of the professional identity of the physician.[8]

Although we did not find a statistically significant association between smoking status and self-recognition as a role model, a physician who smokes may be less likely to motivate and advise smokers to quit.[10,11] Our results also cause concern because, although the cigarette smoking rate was low, we found a high proportion of water pipe experimentation (MPOWER **M**onitor policy), despite the knowledge that smoke is not filtered through the water pipe water, which could negatively impact on the MPOWER **O**ffer policy (help to quit tobacco use).[3] Other national and international studies have also found high rates of water pipe experimentation/use among medical students, which poses an additional challenge to increasing the effectiveness of smoking cessation treatment in Brazil and other countries.[33,34]

Our study has some limitations. It was unable to assess the independent effects of policies other than the smoke-free policy implemented during the study period (e.g., in 2011, a new policy for pricing and taxing tobacco products was implemented in Brazil). Another limitation of the present study was that a reduced number of sixth-year medical students attend formal classes, mostly because they work full time in the hospital and have limited activities in the classroom, which hindered contact between students and researchers and reduced student participation in the study. Although approximately 60% of the third-year medical students were lost to follow-up, our analysis including students who were not successfully followed up produced results that were consistent with those students who were, which suggests that our conclusions might be somewhat generalizable.

In conclusion, knowledge of smoking cessation strategies and self-recognition as role models for patients/society increase over the course of medical school and are associated with the successful implementation of smoke-free policies in enclosed places and on the university campus. This will be

important to improve smoking cessation treatment in the future.

AUTHOR CONTRIBUTIONS

SRM: planning, interpretation of evidence, writing/revision of preliminary and final versions, and approval of final version. ASS: interpretation of evidence, writing/revision of preliminary and final versions, and approval of final version. MAB: interpretation of evidence. GFP: conception, planning, and interpretation of evidence. RBP and EMSL: conception and planning. RGB: writing/revision of preliminary and final versions. FLAF: conception, planning, and writing/revision of preliminary/final versions. MTF: revision of preliminary and final versions. UPS: conception, planning, interpretation of evidence, and drafting/revision of preliminary and final versions.

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