Tobacco Use and Provision of Tobacco Dependence Treatment Among Respiratory

Therapists in Saudi Arabia

Dissertation

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Abstract

Background. Smoking in Saudi Arabia is on the rise, despite the various steps taken by the government to reduce tobacco use. This suggests an urgent need for healthcare professionals, such as respiratory therapists (RTs), to play a proactive role in initiatives aimed at controlling tobacco use. Guided by literature and health behavior theory, we conducted research among RTs in Saudi Arabia to (1) determine the prevalence and correlates of current tobacco use, (2) examine correlates of intention to provide tobacco cessation counseling, and (3) pilot a tobacco cessation training program tailored for RTs in Saudi Arabia.

Methods. We collected online cross-sectional survey data on tobacco use and cessation behaviors and beliefs from a convenience sample of RTs in Saudi Arabia recruited using social media in April to June 2022. Following the completion of the survey, we tailored a training program in tobacco cessation counseling and assessed its effect on knowledge and behaviors through a pilot study with a convenience sample of RTs recruited from hospitals in Saudi Arabia using social media in November 2022 to March 2023. Regression models were fit to the survey data to examine factors associated with tobacco use and intention to provide cessation counseling. To describe changes in beliefs and behaviors following training completion, we used descriptive statistics due to the pilot nature of the study.

Results. The final analytic sample was 202 RTs. The majority of respondents were male, married, held a bachelor's degree, and worked in Riyadh. Overall, the highest prevalence of current use was for e-cigarettes (20.8%, SE 5.8%), followed by waterpipe (17.3%, SE 5.6%), and cigarettes (17.0%, SE 5.5%). Current cigarette smoking was associated with female gender (PR 0.13, 95% CI 0.03 – 0.51), current e-cigarette use was associated with female gender (PR = 0.28, 95% CI 0.12 – 0.68) and relative harm of e-cigarette (PR = 0.73, 95% CI 0.58 – 0.93), and current waterpipe smoking was associated with relative harm of waterpipe smoking (PR 0.49, 95% CI 31 – 0.78). Additionally, intention to provide cessation counseling to tobacco users was associated with having a bachelor's ($\beta = 2.66$, SE = 1.20, p = 0.03) or postgraduate ($\beta = 2.61$, SE = 1.28, p = 0.04) degree compared to an associate degree, and higher perceived behavioral control ($\beta = 1.22$, SE = 0.38, p < 0.01). Of the 8 RTs who completed the training program, all reported higher favorable attitudes toward, subjective norms of, perceived behavioral control of, and intentions to providing tobacco cessation counseling. Additionally, they reported lower perceived barriers, higher knowledge of tobacco dependence treatment, and higher frequency of delivering brief cessation counseling behaviors.

Conclusion. The findings from this research can be leveraged to establish new and refine existing policies and interventions to further reduce the burden of tobacco use among Saudi RTs and the general population and improve delivery of tobacco cessation counseling among Saudi RTs. This research serves as a foundation for future research examining the impact of tobacco cessation training on Saudi RTs' counseling behaviors.

Dedication

Dedicated to the memory of my beloved parents

Ahmed Abdulkareem Alalwan

and

Afifah Abbass Alhashim

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Fields of Study

Major field: Public Health

Table of Contents

List of Tables

List of Figures

Chapter 1. Introduction

The Saudi Vision 2030, launched in 2016, set a new roadmap for the country with six overarching objectives that cover enhancing government effectiveness, enabling social responsibility, increasing economic diversity, and promoting healthy life.[1] In response to this vision, the Saudi Ministry of Health (MoH) announced three central goals to transform the health care system. These goals focused on enhancing therapeutic and preventive health care services, including improving health and quality of life, improving quality and efficiency of health- and preventive-care services, and improving value.[2] In line with these objectives, the Saudi government and MoH launched many initiatives to combat tobacco use, a major public health concern in Saudi Arabia.[3] Some of these initiatives included implementing a sales tax (100% excise duty) and increasing the number of the MoH-tobacco cessation clinics that provide free counseling and medications (from 160 in 2017 to 542 in 2019).[3]

Despite those efforts and initiatives, smoking is increasing in Saudi Arabia, while in high-income countries it has been on the decline for decades.[4,5] National surveys showed that the prevalence of tobacco use increased from 12.1% to 17.9% (23.7%-27.5% in men, 1.4%-3.7% in women) between the years 2013 to 2019.[5–7] The burden of smoking-related diseases is high in Saudi Arabia and, because of the persistent smoking

prevalence and aging population, it is projected to increase.[8–11] Additionally, recent reports from the Saudi MoH show that combined respiratory diseases—which include tobacco-related disease such as pulmonary tuberculosis, most lung cancers, and chronic obstructive pulmonary disease (COPD)—[12–15] were the 5th leading cause of death after external causes of morbidity and mortality, diseases of the circulatory system, perinatal conditions, and injury.[8] This high burden of tobacco use calls for more health care providers to actively engage in tobacco control efforts.

Health care providers, in general, are in a good position to treat tobacco dependence, given their regular interactions with smokers who receive care for tobacco-related conditions. Due to the effectiveness of in-hospital tobacco dependence treatment, hospitalization represents a good opportunity for health care providers to combat tobacco use.[16] Because Saudi hospitals are smoke-free,[17] hospitalized smokers undergo short-term tobacco abstinence during their hospital admission period. Also, hospitalization may offer a window in which patients can be more receptive to tobacco dependence treatment and motivated to quit smoking due to a decline in their health status. Nevertheless, only about 54% of current smokers in Saudi Arabia reported being advised to quit smoking by a health care provider during any visit to a doctor or other health professional in the past 12 months.[5,6] However, there is a gap in the literature related to whether hospitalized smokers, in particular, are advised to quit smoking at any point of their hospital admission.

Respiratory therapists (RTs)—who mostly treat cardiopulmonary patients— are in a unique position because they have frequent opportunities to address tobacco use in a clinical setting with a particularly high-risk population.[18] RTs also have extensive experience interacting with smokers, which are most of their patients.[19] However, in Saudi Arabia, RTs rarely deliver tobacco dependence treatment to patients and it is unclear why. Health care providers, in general, face many barriers to delivering tobacco dependence treatment, including lack of training, poor counseling skills, and low knowledge.[20,21] In fact, few reports have examined such barriers to delivering tobacco dependence treatment among RTs in Saudi Arabia. Although some reports suggested that Saudi health care providers have a smoking prevalence similar to the general population,[22–24] there is little information regarding RTs' tobacco use behaviors and predictors of tobacco use. RTs may be using tobacco themselves, potentially impacting their willingness to deliver tobacco dependence treatment. Additionally, there is little known about the attitudes, knowledge, and skills related to delivering tobacco dependence treatments among Saudi RTs. Moreover, lack of training among Saudi RTs may be a significant barrier to providing tobacco dependence treatment, which is a barrier reported among RTs in the United States.[18] This leaves an available workforce of RTs without the proper skills to combat tobacco use. Without a thorough understanding of these factors, it will be difficult to determine their impact on the provision of tobacco dependence treatment and customizing an effective training program.

In-hospital tobacco dependence treatment is an effective approach for smoking cessation[16] and our training program aimed promote this behavior among RTs. Our study was the first to assess how tobacco use and knowledge of tobacco harm, as well as how attitudes, knowledge, and skills related to tobacco dependence treatments impact the delivery of such treatments among RTs in Saudi Arabia. With this information we tailored an existing training program to meet the needs of RTs in Saudi Arabia. Identifying the knowledge, behavior, attitudes, and intentions associated with tobacco use/tobacco dependence treatment will gave us crucial information to tailor a training program that has been developed for RTs in the US.[25,26] This study also established the earliest infrastructure for a national training program designed for Saudi RTs.

The overall goal of this study was to assess the attitudes, behaviors, and knowledge of Saudi RTs associated with tobacco use and delivering tobacco dependence treatment to patients who smoke, and subsequently pilot a training program in tobacco dependence treatment, specifically designed for RTs. Our focus was on RTs who have the potential to directly impact smokers at high risk for disease. Our objective was to determine the associations between these attitudes, behaviors, and knowledge with (1) self-reported use of tobacco products, (2) intention to provide tobacco dependence treatment to patients, and (3) the impact of tobacco dependence training on therapists' delivery of tobacco dependence treatment. This study delineated the importance and potential effectiveness of providing tobacco dependence treatment by RTs in Saudi Arabia.

Specific Aims

Our project was divided into two components: Component I (SA 1 and SA 2) and Component II (SA 3). Both Components were conducted with convenience samples of RTs in Saudi Arabia. The Specific Aims of our project were:

SA 1. To determine tobacco use behaviors and predictors of tobacco use among registered RTs in Saudi Arabia.

This aim used a cross-sectional design, focusing on describing tobacco-related characteristics among RTs in Saudi Arabia, including use of each tobacco product of interest (cigarettes, waterpipe, e-cigarettes) and predictors of tobacco use. We expected tobacco use prevalence will be similar to or higher than the existing prevalence in the general population (12.1% to 17.9%) but hypothesized that gender was associated with tobacco use. Additionally, we expect gender to be an important predictor of tobacco use. This aim addressed the tobacco use-related gaps.

SA 2. To determine attitudes, subjective norms, and perceived behavioral control related to delivering tobacco dependence treatments among registered RTs in Saudi Arabia.

Specific Aim 2 also used a cross-sectional design, focusing on characteristics related to intention of providing tobacco dependence treatment. We used the theory of planned behavior (TPB) to predict and explain RT's behavioral intentions—which are determined by their attitudes towards this behavior, subjective norms, and perceived behavioral control—related to providing tobacco dependence treatment. Using a TPB

5

driven approach, we evaluated factors related to the three main determinants of intention of providing tobacco dependence treatment, including other factors captured through the three main determinants such as knowledge and skill levels. We hypothesized that RTs who have favorable attitudes towards, social norms of, and perceived behavioral control of tobacco dependence treatment will have higher intention of providing tobacco dependence treatment. This aim identified potential determinants of provision of tobacco dependence treatment.

SA 3. To tailor and pilot a smoking cessation training program for registered RTs in Saudi Arabia.

Specific Aim 3 primarily focused on the feasibility of our training program among RTs. We assessed the feasibility measures of the training program, especially changes in RTs' knowledge, skills, and behaviors related to tobacco dependence treatment. We evaluated some of the measures of SA 1 and SA 2 in a pre-training-post-training design. We hypothesized that the training program will increase the level of knowledge, skills, and intention to provide and provision of tobacco dependence treatment.

Literature Review

The Burden of Tobacco in Saudi Arabia

While smoking in high-income countries has been on the decline for decades, it is increasing in Saudi Arabia. According to the World Bank, Saudi Arabia is a high-income country with a gross national income per capita of $21,900, well above the cut-off of $13,205 for high-income classification.[27] However, only a few studies in Saudi Arabia examined smoking status using population-based sampling methods. The Saudi Ministry of Health (MoH) conducted several cross-sectional population surveys in collaboration with international institutions such as the World Health Organization (WHO), starting from 2005 and most recently in 2019. These studies define current tobacco use as daily use or less than daily use using the following question: Do you *currently* smoke tobacco on a daily basis, less than daily, or not at all?

In 2005, Saudi Arabia conducted a national survey within WHO STEPwise Approach to Non-communicable Diseases Risk Factor Surveillance (STEPS), one of its earliest nationally representative surveys among men and women aged 15 or older with data on tobacco consumption.[28] STEPS used standardized instruments and protocols for data collection, analysis, and dissemination on key behavioral risk factors, including tobacco use. This survey reported a prevalence of current tobacco use (daily and non-daily) of 24.2% among men (20.9% aged 25-64 years old) and 1.4% among women (1.4% aged 25-64 years old). Since then, a 2012 study named the BREATHE study that used large population-based samples and examined smoking patterns in ten Middle East and North Africa (MENA) countries, including Saudi Arabia, among adults aged 40 or

7

older found that the prevalence of tobacco use was 38.7% among men and 7.4% among women in Saudi Arabia.[9] The age- and sex-adjusted prevalence of cigarette, waterpipe, both, and any smoking in Saudi Arabia were 18.1%, 5.7%, 4.0%, and 27.9%, respectively. Among the 10 MENA countries, waterpipe use with or without cigarettes was the highest in Saudi Arabia.

More recent studies show similar patterns of tobacco use to the WHO-STEPS survey. In 2013, the Saudi MoH conducted the Saudi Health Interview Survey (SHIS), a nationally representative sample with a multistage design, among men and women aged 15 or older, in collaboration with the Institute for Health Metrics and Evaluation (University of Washington). SHIS showed that the overall prevalence of current tobacco use (daily and non-daily) was 12.1%, with 23.7% among men (28.9% aged 25-64 years old) and 1.5% among women (2.0% aged 25-64 years old).[5,6] Additionally, the highest prevalence of current tobacco use was 15.6% among people aged 55-64 years old, with 24.7% among men and 4.2% among women in this age group.[6] Similarly, a 2016 nationally representative demographic survey of people aged 15 or older conducted by the Saudi General Authority of Statistics showed that the prevalence of current tobacco use (daily and non-daily) was 20.4% among men and 0.3% among women.[29] However, the prevalence of tobacco use varied by province, ranging from 11.1% to 32.1% among males aged 15 or older. Other provinces reported a prevalence of around 20% among males aged 15 or older. The most recent population survey results were from the Global Adult Tobacco Survey (GATS) in 2019, which was conducted for the first time in Saudi Arabia.[7] Compared to SHIS 2013, GATS 2019 shows a considerable increase in the prevalence of current tobacco use with an overall prevalence of 19.8%. The prevalence

among men slightly increased with a prevalence of 30% and more than tripled among women with a prevalence of 4.2%.

Cigarettes

The aforementioned surveys assessed the use of several tobacco products, including cigarettes, cigars, pipes, and waterpipe. However, cigarettes are the most commonly used tobacco product in Saudi Arabia.[6,9] A 2018 study that pooled data from two national surveys examined the prevalence of cigarette use among adults aged 18 or older.[4] They found that the overall population prevalence of current cigarette smoking (daily and non-daily) was 21.4%, with 32.5% among men and 3.9% among women. Similar to overall tobacco use, the prevalence of cigarette smoking differed by province, ranging from 12.6% to 25.2%. Likewise, GATS 2019 found that the prevalence of current cigarette smoking was 15.9% (24.9 % in men, 2.5% in women).[7]

Waterpipe (Hookah)

Waterpipe smoking, also known locally as shisha or *mu'assal*, is common in Saudi Arabia and has gained more widespread use in recent years. The three population studies—STEPS, SHIS, and GATS 2019—also examined current use of waterpipe. The prevalence of current waterpipe smoking (daily and non-daily) more than doubled from 3.3% in 2005 to 7.3% in 2013 among men and nearly tripled from 0.5% to 1.3% among women during the same period.[5,28] The prevalence of current waterpipe smoking seems to continue in the same direction, with GATS 2019 reporting a prevalence of 9.7% among men and 2.3% among women.[7]

This trend appears to be more common in MENA countries, including Saudi Arabia. In general, risk perception of waterpipe smoking in this region use is lower,

which may play an important role in this trend. The lower perception of risk mainly stems from a common misconception that water, a component in waterpipe, reduces some of the harmful effects.[30,31] Nevertheless, this increase in waterpipe use appears more salient among women and young adults who find waterpipe smoking more socially acceptable and commonly smoke waterpipe during social gatherings.[30,32] Most studies on waterpipe use in Saudi Arabia target adolescents and young adult college students, which consistently show high prevalence among this age group.[33–44] Studies showed that past-30-day use of waterpipe ranged between 22.8% (25.4% in men and 19.4% in women) to 34.0% (42.5% in men and 27.0% in women) among university students in different regions of Saudi Arabia.[33,40]

E-cigarettes

E-cigarettes have been recently introduced in the country and are gaining popularity, especially among young adults.[45,46] The only population survey that examined e-cigarette use was GATS 2019, which indicated that about 37.8% of the Saudi population ever heard of e-cigarettes (45.7% in men, 26.0% in women). It also showed that the prevalence of ever use (ever even once) and current use (current daily and less than daily) of e-cigarettes were 3.1% (4.5% in men, 1.2% in women) and 0.8% (1.1% in men, 0.4% in women), respectively.[7] Similar to waterpipe, the popularity of e-cigarettes seems to be popular among young adults.[45,46]

Several other studies with a cross-sectional design were conducted among college students in Saudi Arabia. A cross-sectional survey of health sciences students from three universities in Jeddah found that the prevalence of e-cigarette use was 27.7%.[45] Another

study that examined medical students in year 1 through 5 at one university in Riyadh, the most populous city and capital of Saudi Arabia, found a prevalence of 12.2%.[46]

In summary, the burden of tobacco use in Saudi Arabia is consistently high as depicted by the three major surveys conducted by the MoH—STEPS, SHIS, and GATS 2019. The prevalence of current tobacco use ranged from 12.1%-17.9% (23.7%-27.5% in men, 1.4%-3.7% in women). The most common tobacco products are cigarettes, followed by waterpipe and e-cigarettes. The most recent survey (GATS 2019) showed that current cigarette use was similar to the overall tobacco use. However, current waterpipe use was consistently increasing from 2005-2019, with its prevalence nearly tripling from 3.3% to 9.7% in men and quadrupling from 0.5% to 2.3% in women. On the other hand, e-cigarettes, a recently introduced tobacco product in Saudi Arabia, seem to be popular, with about 37.8% of the Saudi population having ever heard of e-cigarettes and an estimated current use prevalence of 1.1% in men and 0.4% in women.

Burden of Tobacco-related Respiratory Diseases in Saudi Arabia

The burden of tobacco-related diseases is high in Saudi Arabia, and because of the unabated tobacco use prevalence and aging population, it is projected to increase.[8–11] Additionally, recent reports from the Saudi Ministry of Health show that combined respiratory diseases were the 5th leading cause of death.[8] A study that conducted a systematic analysis for the Global Burden of Disease in 204 countries and territories found that tobacco use moved from the 7th leading risk factor that drives the most death and disability combined in Saudi Arabia in 2009 to the 6th in 2019.[47] Some of those tobacco-related diseases are chronic obstructive pulmonary disease (COPD) and cancer.

Several studies with a cross-sectional design were conducted to estimate the prevalence of COPD—a tobacco-related disease—in different regions of Saudi Arabia. The BREATHE study that was conducted in ten MENA countries, including Saudi Arabia, queried its participants about COPD-related symptoms.[48] They found that age and sex-adjusted prevalence of COPD-related symptoms (productive cough, breathlessness alone, or both) was 14.3% in Saudi Arabia. Nevertheless, COPD was defined as a self-reported diagnosis, having COPD symptoms, or lifetime smoking of 10 pack-years or more with an overall prevalence of 2.4% (3.5% in men, 1.0% in women). A large population survey of COPD conducted between June 2010 and December 2011 in Saudi Arabia found an age- and sex-adjusted prevalence of 2.4% of self-reported COPD (3.5% in men, 1.0% in women).[49]

Studies that diagnosed COPD using Pulmonary Function Testing (PFT) found higher prevalence than self-reported studies. Among a sample of primary care patients aged 40 years old or older, the prevalence of COPD—diagnosed using PFT—was 14.2%.[50] Of those diagnosed with COPD, about 44% were in GOLD stage III, while the remaining patients were in GOLD stage II. However, a stratified multistage random sample of men and women aged 40 or older conducted in Riyadh found a lower overall prevalence of COPD of about 4.2% (5.7% in men, 2.5% in women), diagnosed using PFT.[51]

Another tobacco-related disease is cancer, which is a group of several diseases caused by smoking. A recent study that analyzed data from the Gulf Cooperation Council (GCC) countries, which includes Saudi Arabia, found that 16.3% of all cancer cases in the region were attributed to tobacco use.[52] Among men, the highest number of incident

cases attributed to smoking was lung cancer, followed by urinary bladder cancer and colorectal cancer. While among women, the highest number of incident cases attributed to smoking was lung cancer, followed by oral cancer and cervical cancer.

Tobacco use among Health Care Providers in Saudi Arabia

Several small studies, limited to certain regions of Saudi Arabia, examined smoking behaviors and attitudes towards smoking among health care providers. Current smoking prevalence among health care providers in Saudi Arabia is similar to the smoking prevalence in the general population. Studies consistently indicated a high prevalence of tobacco use among physicians, and other health care providers.

Tobacco Use Among Physicians

Many studies examined tobacco use among physicians working in primary care centers and hospitals in Riyadh. Among random samples of primary care physicians, the prevalence of current smoking ranged between 16%-17.0%.[23,53] However, among a sample of physicians from four hospitals showed a high prevalence of waterpipe smoking (45% overall; 58% in men; 18% in women).[54] Similarly, another cross-sectional study was conducted among physicians in three district hospitals to determine factors associated with smoking. They found a high prevalence of smoking (overall 34.8%; 70.4% in men; 29.6% in women) with higher likelihood in residents (trainees), medical specialists, and physicians with a large number of on-call duties. More than half of the respondents were younger than 30 years old. The prevalence of current cigarette and waterpipe smoking were 22.8% and 20.0%, respectively. The most smoking prevalent group was residents, with a prevalence of 50%.[55]

Tobacco Use Among Other Health Care Providers

There are also studies on tobacco use among non-physician healthcare providers. Among health care providers from a military hospital in Riyadh, current smoking was estimated at 19.0%.[24] Similarly, another study that examined tobacco use behaviors among health care providers in public hospitals and primary care centers found a current tobacco use prevalence of approximately 14.8%.[56] Additionally, a cross-sectional survey of several health care providers, including allied health professionals and administrative workers found an overall current smoking prevalence of 18.4% (18.5% in allied health providers, 30.3% in administrative workers).[22] On the other hand, a survey among a sample of dentists in Riyadh found a high prevalence of current tobacco use of 33.8%.[57] Likewise, another cross-sectional survey that examined waterpipe use among dentists in AlMadinah AlMunawarah—the second holiest city in Islam, which imposes a citywide tobacco sales ban since 2002[58]—found that 26.0% were current waterpipe smokers.[59] Of those who were current waterpipe smokers, majority (77%) smoked it monthly, 19% smoked it on weekly basis, and 4% on a daily basis. More than half of them indicated that they were dual tobacco users (waterpipe and cigarettes). Additionally, a study that examined smoking behaviors among community pharmacists in Riyadh found a an estimated prevalence of 19.9%.[60]

Respiratory Therapists (RTs) Role

Respiratory Therapy (RT), or as it is currently known as Respiratory Care (RC), is a relatively new profession in Saudi Arabia (started in 1976)[61] compared to the U.S. counterpart profession that was formed in the 1940s.[62] In Saudi Arabia, the profession started as on-the-job training.[61] Training then progressed to more structured 2.5-3-year programs, known as diploma programs, then to baccalaureate programs. These

14

developments in educational structure and requirements lead to rapid changes in the role of RTs, adding more duties and responsibilities in management and prevention of cardiorespiratory diseases and matching its U.S. counterpart.[61]

All health care providers, including RTs, must be registered by the Saudi Commission for Health Specialties (SCFHS) to practice in Saudi Arabia. SCFHS also provides a rank according to the educational level of the health care provider.[61] For instance, an RT graduate from a diploma program would be classified as an RT technician, while a graduate from a bachelor's degree program would be an RT specialist. SCFHS also offers credentials in twelve subspecialties under the RC classification, including adult, neonatal and pediatric, and education specialties.[63]

RTs typically provide care to cardiopulmonary patients in all hospital areas such as medical and surgical wards and intensive care units, emergency departments, and pulmonary labs and clinics. They also provide care to all patient populations ranging from premature babies to adults and geriatrics. A national survey of hospitals in Saudi Arabia, conducted in 2011, found that only 88 (21.4%) hospitals had RTs.[64] The study also reported a total of 1,477 RTs in the country, with a majority of them females (53%), working in governmental non-MoH hospitals, and covering critical care units (60%). The study also reported other care areas where RTs provide care, which included general ward care (22%) and diagnostic labs such as pulmonary function testing and sleep studies labs (5.7%). However, these numbers may not accurately reflect the current distribution of RTs due to the rapid development of colleges, hospitals, and recruitment of RTs over the past ten years. Although the MoH provides annual statistics on its workforce, the

number of RTs cannot be tracked because it is reported under the umbrella of allied health professions, which encompasses many professions.

Similar to RTs in U.S. and Canada, RTs in Saudi Arabia do not prescribe drugs to their patients; only physicians can do so.[65] However, RTs manage diseases and conditions using therapist-driven protocols that enable them to provide certain respiratory drugs given by inhaled route or make changes to therapeutic modalities with only an initial physician's order to initiate these protocols. These protocols may vary from one hospital to another, depending on their policies and procedures. Part of the RT's role is to provide educational sessions to the patients who receive respiratory drugs, for conditions such as asthma and COPD, during their admission period and before discharge. These educational sessions typically include instructions on how to use the medications and prevent future exacerbations of their conditions.

Given the role of RTs in clinical settings, their regular interaction with cardiopulmonary patients, and their extensive experience interacting with smokers that make up most of their patients,[19] they are in a unique position to address tobacco use in a clinical setting with a particularly high-risk population. Nevertheless, RTs in Saudi Arabia rarely deliver tobacco dependence treatment to their patients and it is unclear why. Like other health care providers, RTs may face barriers and challenges to delivering tobacco dependence treatment. However, there is little known about these barriers among RTs in Saudi Arabia.

Role of Health Care Providers in Delivering Tobacco Dependence Treatment

Health care providers play an essential role in tobacco dependence treatment. They are in a good position to treat tobacco dependence, given their regular interactions with smokers who receive care for tobacco-related conditions. Tobacco dependence interventions follow the clinical practice guidelines recommended by the WHO, the U.S. Public Health Service, and the guidelines recently published by the Saudi National Committee for Tobacco Control.[66–68] These clinical practice guidelines recommend a multidisciplinary approach for tobacco dependence treatment using strategies to identify all patients who are tobacco users, advised them to quit, and treat them using scientifically sound methods. The guidelines urge clinicians and clinical teams who are time-constrained and encounter a variety of patients—e.g., physicians, RTs, nurses, and dentists—to prioritize providing brief systematic clinical interventions for tobacco use and dependence. The guidelines also provide several strategies to deliver five major components of a brief intervention known as the "5 A's" model: Ask about tobacco use, advise to quit, assess willingness to quit, assist in quit attempt, and arrange follow-up. This type of brief interventions provided by health care professionals—which may last for less than three minutes—improve quit rates among tobacco users.

Despite the significant role in tobacco dependence treatment, there is no evidence in the literature that Saudi health care providers consistently follow the recommended guidelines. SHIS indicated that only about 54% of current smokers (54.5% in men, 45.2% in women) in Saudi Arabia reported being advised to quit smoking by any type of health care provider.[5,6] Likewise, a cross-sectional survey in Riyadh also found that only

53.2% of primary care and family physicians reported documenting the patient's smoking status.[69]

Health Care Providers' Perceived Barriers to Delivering Tobacco Dependence Treatment

Health care providers face many challenges and barriers to delivering tobacco dependence treatment. A cross-sectional survey in Saudi Arabia and Kuwait found that the top three perceived barriers of delivering tobacco dependence treatment among dentists were lack of time, followed by the providers' perceived fear of patient dissatisfaction and lack of training.[70] Similarly, another cross-sectional survey among primary care and family physicians in two academic medical centers in Riyadh found that lack of time, lack of training, and reporting that patients were not interested were the most commonly perceived barriers.[69] They also found that significant predictors of the implementation of the 5 A's included being aware of the clinical guidelines, perceived competence to providing tobacco dependence treatment, and reporting the ineffectiveness of smoking cessation therapy as a barrier (most physicians reported counseling as effective). A study conducted among primary care physicians from 5 Health centers of the Ministry of National Guard in Jeddah found that the overall knowledge of smoking cessation counseling was poor with an average level of practice.[71] Another important barrier is the smoking status of the health care provider; several studies found that health care providers who were smokers had unfavorable attitudes and practice towards tobacco dependence treatment.[23,69,70] Given the high prevalence of smoking among health care providers in Saudi Arabia, their smoking behaviors may be an important factor associated with the provision of tobacco dependence treatment.

18

Effectiveness of in-Hospital Tobacco Dependence Treatment

Despite international clinical practice guidelines recommending tobacco dependence treatment in all clinical settings, the guidelines published by the Saudi National Committee for Tobacco[68] do not address in-hospital tobacco dependence treatment. However, in-hospital tobacco dependence treatment is an effective approach for smoking cessation.[16,16] Because smokers have a higher risk of hospitalization and use of health care services,[72–74] hospitalization represents a good opportunity for health care providers to intervene on tobacco use.[75] Saudi hospitals are smoke-free,[17] which forces hospitalized smokers to undergo short-term tobacco abstinence during their hospital admission period. Also, hospitalization may offer a window in which patients can be more receptive to tobacco dependence treatment and more motivated to quit smoking due to a decline in their health status.[16]

In two Cochrane systematic reviews for smoking cessation interventions in hospitalized patients, smoking cessation counseling—that started during hospitalization period with follow-up support of more than one month post-discharge—showed significant increases in smoking cessation rates.[16,75] The most recent review concluded that adding nicotine replacement therapy (NRT), including nicotine patch, nicotine gum, or inhaled nicotine, to intensive smoking cessation counseling had significant increases in smoking cessation rates.[75] Both reviews also showed similar significant results among a subgroup of cardiovascular patients who underwent intensive smoking cessation counseling with or without pharmacotherapy.[16,75]

Behavioral Counseling Interventions

19

Many clinical trials examined the effectiveness of behavioral counseling to treat tobacco dependence for hospitalized patients. These studies differed widely in their designs as well as the intensity of their interventions. The providers included in Rigotti and colleagues' reviews were research nurses, trained counselors, physicians, and respiratory therapists (RTs) counseled their patients to quit smoking.[16,75] The interventions ranged from less than five minutes to up to two hours and were delivered at different time points during hospitalization and in some studies multiple times. Studies that provided less intensive in-hospital counseling—a single short counseling session, one or more long counseling sessions, and any number of counseling sessions with follow-up for one month or less—had minimal or no effect on smoking cessation. However, higher intensity counseling—any number of counseling sessions with follow-up for more than a month—showed significant increases in smoking cessation rates (risk ratio (RR) 1.37, 95% confidence interval (CI) 1.27 to 1.48).[16,75]

Pharmacotherapy Interventions

Several clinical trials reviewed by Rigotti and colleagues also tested the effectiveness of adding NRT, bupropion, or varenicline to behavioral counseling to treat tobacco dependence for hospitalized patients, but these pharmacotherapies were not compared alone to a control group. In most studies, these drugs were not given to all the intervention group or excluded from the control group. Significant increases in smoking cessation rates were found when NRT (RR 1.54, 95% CI 1.34 to 1.79) was added to behavioral counseling but not with bupropion (RR 1.04, 95% CI 0.75 to 1.45) or varenicline (RR 1.28, 95% CI 0.95 to 1.74).[75] This lack of effectiveness in the context of hospitalization may be due to the long half-life of these drugs, which takes about five to

seven days to achieve a therapeutic level.[75] Consequently, patients may be discharged from the hospital before achieving effective levels.[75]

Impact of Training Health Care Providers in Tobacco Dependence Treatment

Although there were no reported studies from Saudi Arabia, clinical trials conducted in other countries reported that training health care providers has an impact on the providers' smoking cessation counseling behavior (e.g., use of the 5 A's model). These clinical trials used various modes of training including group sessions,[76–81] one-on-one sessions,[82] and both[83–85] to train physicians,[76–78,81–83,85] dentists,[84] nurses,[80] pharmacists,[79] and physician assistants.[80] Those trials applied different behavioral theories to design their training programs, such as the trans-theoretical model[79,81,85] and the 5 A's model,[82] with integrated reminders to prompt the health care provider to ask about the smoking status[83,84] or provide a form of feedback to the provider like the number of counseled patients.[80,82,85] Although the intensity of training (number of sessions:1-5 sessions; duration: 40-minute to 1-day-long session) varied, many studies reported a significant increase in the number of patients asked to set a quit date (or prescribed a quit date) by health care providers who were trained, compared to those who were not trained.[76–78,83,84] Similarly, a significant increase in the number of patients counseled to quit smoking,[76–80,82–84] asked to make a follow-up appointment,[76–78,82] received self-help materials,[76–78,81,82,85] or received NRT[76,79,81] by those who underwent training.

The aforementioned studies did not examine the impact of training in tobacco dependence treatment among RTs. Only three studies examined the behavioral effects of training in tobacco dependence treatment among RTs in the U.S. and Canada.[18,86,87]

21

Despite the differences in design, all three studies found an increase in counseling practices after training. One study examined the impact of self-reported training using an observational study design.[86] Researchers found that self-reported training in cessation counseling was associated with significantly increased counseling practices independent of patients' readiness to quit, compared to untrained RTs.[86] On the other hand, a pilot study implemented an online training program developed by the American Association for Respiratory Care (AARC) among a sample of RTs.[18] They found an increase in the mean pre- to post-training changes of asking patients whether smoker, advising to quit smoking, referring to cessation counseling, and referring to the National Network of Tobacco Cessation Quitlines. The only randomized trial, in which RTs who were randomized to an immediate web-based program versus delayed training, found significant changes in all behaviors of the 5 A's model except the ask variable.[87] The three studies also reported the impact of training on RTs' confidence rating, self-efficacy rating, and perceived barriers to delivering smoking cessation counseling. They found an increase in confidence,[18] self-efficacy[18,86,87] and a reduction in perceived barriers to providing effective counseling were better among trained RTs.[86,87] RTs reported several barriers to implementing the training program, including lack of knowledge, training, time, and confidence in counseling.[18,86,87]

Theoretical Framework (Theory of Planned Behavior (TPB))

An individual's intentions to perform a behavior (behavioral intention) are usually good predictors of future behavior.[88,89] Two related theories—the theory of planned behavior (TPB) and the theory of reasoned action (TRA)—have been used to explain behaviors and intentions of behaviors among health care providers. Both theories share

22

two constructs, which are attitudes towards the behavior (beliefs) and perceived subjective norms (social pressure).[88,89] These two theories state that an individual's intention to perform a behavior determines their behavior; their intention is a function of their attitudes and subjective norms.[88,90] An individual's attitudes towards a behavior are a function of the beliefs about the behavior's outcomes and evaluation of the values of the behavior's outcomes.[89] On the other hand, subjective norms are a function of normative beliefs, which is an individual's perceptions of what others think this individual should do and motivation to comply with these perceptions.[89]

The TPB extends the TRA by adding a third construct, which is perceived behavioral control (self-efficacy). Perceived behavioral control is a function of control belief: the perceived likelihood that a barrier or a facilitator will occur, and the perceived power of these barriers or facilitators to make performing the behavior difficult or easy.[88,90] Thus, the TPB model stipulates that when positive feelings in these three primary components—which are the determinants of behavioral intentions—are increased, the likelihood of the intention to perform the behavior will increase; subsequently, the likelihood of performing the behavior will increase. This model also captures the impact of other factors on the intention to perform behaviors, such as demographics, through its primary determinants—attitudes, subjective norms, and perceived behavioral control.[89] Figure 1 provides a summary of the TPB model constructs and how they relate to our project.

Figure 1. Constructs of the theory of planned behavior in relation to tobacco dependence treatment
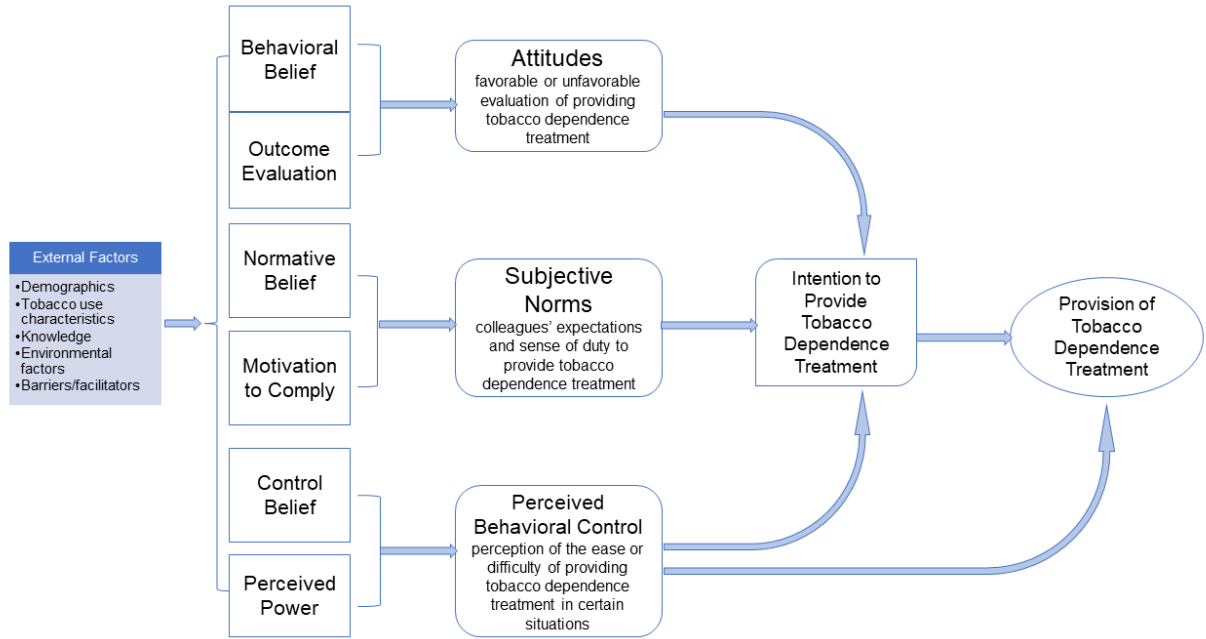
Many studies examined the use of the TPB model to explain a wide range of behaviors and intentions among different health care providers such as physicians, nurses, and pharmacists. Using the TPB model, results varied across the studies. There were variations in the results depending on the profession as well as the behavior examined. Several studies were conducted among physicians to determine how the constructs of the TPB model were associated with their intentions and self-reported behavior.[91–95] When intentions of using a guideline implementation were examined among all physicians, the most significant predictor was attitudes.[91] However, among junior physicians, the most significant predictor was subjective norms.[91] When other behaviors, such as use of drug information, requesting autopsies, providing education, or drug prescription, were examined among physicians, the most significant predictors were social norms, perceived behavioral control, and attitudes.[92–95] Likewise, studies among

other health care providers, such as nurses and pharmacists, that examined several behaviors showed similar results to physicians, in which the most significant predictors varied depending on the profession and behavior examined.[96–100] Some of the behaviors examined among other health care providers included pharmacists' practices,[96,97] provision of care to different patient populations,[98,99] and pharmaceutical care delivery.[100]

To explain provision and intention of provision of tobacco dependence treatment, several studies examined the use of the TPB model among different health care providers. A cross-sectional study in England among dentists found that their attitudes were the most significant factors associated with preventive care.[101] Dentists with positive attitudes towards preventive care were more likely to advise their patients to quit smoking. However, a survey among smoking cessation counselors in Taiwan found that the most significant predictors of their intention to provide smoking cessation support included perceived behavioral control, self-confidence, knowledge, and professional specialty.[102] Another study that examined intentions to providing smoking cessation support among mental healthcare providers found that significant predictors included the providers' attitudes, perceived behavioral control, and history of providing cessation support.[103] Similarly among nurses, significant factors associated with the provision of cessation advice included their attitudes towards offering such advice, perceived behavioral control, and the hospital unit they covered.[104] Among community nurses, a cross-sectional survey of several elements of the TPB model predicted the nurses' intentions to use clinical guidelines.[105] The most significant predictors included attitudes and perceived behavioral control.

Only a few studies used the TPB model to identify predictors of health care providers' behaviors and applied their findings to change their behaviors. Jenner and colleagues identified that attitudes and perceived behavioral control were the most important predictors of the intention and self-report of hand hygiene, respectively.[106] Subsequently, they used their findings to provide an action plan to examine and evaluate changes in behavior. Moreover, using the TPB model, Cassista and colleagues designed an intervention based on their findings to change nurses' intention to use filter needles.[107] They found a significant increase in the determinants of intention, which are the attitude and perceived behavioral control. Despite the rare use of the TPB model to change health care providers' behaviors, its successful application to change patients' behaviors[108,109] and its rigorous underpinnings indicate similar results with health care providers.

In our project, the TPB is essential to predict and explain the RTs behaviors in tobacco use and tobacco dependence treatment and ensure our intervention is well designed for changes in RTs behaviors. The TRA and TPB models emphasize the importance of attitudes and subjective norms; however, perceived behavioral control explains more variability in intentions and behaviors.[90] In addition, the TPB seems to be an appropriate model to predict behaviors among health care providers.[110] Health care providers in general face many factors that can be barriers or facilitators to certain behaviors, the addition of *perceived behavioral control*—which can be affected by the perception of these factors—makes the TPB an appropriate model for the prediction of health care providers' behaviors.[90]

To sum up, the TPB model states that an individual's intention to perform a behavior determines their behavior; and their intention is a function of their attitudes,

subjective norms, and perceived behavioral control. This model also captures the impact of other factors on the intention to perform behaviors through those three primary determinants. The TPB model has been used to explain a wide range of behaviors and intentions, including provision of tobacco dependence treatment, but the results of the most important determinants varied across the studies according to the profession and the behavior examined. However, a few studies used the TPB model to identify barriers that impact health care providers' behaviors and applied their findings to change their behaviors, which found a significant increase in the determinants of intention.

Our project addressed the gaps in the literature related to tobacco use and provision of tobacco dependence treatment among RTs in Saudi Arabia. Despite their unique position to address tobacco use, RTs in Saudi Arabia rarely deliver tobacco dependence treatment to patients and it is unclear why. Few reports have examined the level of knowledge RTs in Saudi Arabia have about tobacco use and tobacco dependence treatment. Moreover, RTs may be using tobacco themselves, potentially impacting their willingness to deliver tobacco dependence treatment. Also, there is little known about Saudi RTs' attitudes, knowledge, and skills related to delivering tobacco dependence treatment. Additionally, RTs are not formally trained to provide tobacco dependence treatment, which may be a limiting factor among Saudi RTs.

Chapter 2. Research Design and Methods

Overview

This research proposal aimed to assess the attitudes, behaviors, and knowledge associated with tobacco use and provision of tobacco dependence treatment among respiratory therapists (RTs) in Saudi Arabia. Subsequently, we piloted a tailored training program in tobacco dependence treatment, which aimed to promote provision of tobacco dependence treatment by RTs. Our project was composed of two components. The first component was a cross-sectional study designed to 1) determine tobacco use behaviors and knowledge of tobacco-related harms (Specific Aim 1) and 2) determine attitudes, subjective norms, and perceived behavioral control related to delivering tobacco dependence treatments among registered RTs in Saudi Arabia (Specific Aim 2) using online survey of a convenience sample of registered RTs. The second component used the results from Aims 1 and 2 to tailor and pilot test a tobacco cessation training program for registered RTs in Saudi Arabia (Specific Aim 3). Questionnaires and tests were employed before and after the implementation of the training program.

Component I (SA 1 and SA 2): Knowledge, Attitudes, Behaviors, and Skills Related to Tobacco Use and Provision of Tobacco Dependence Treatment

Participants and settings

The participants for this component were RTs who self-reported that they have been classified and registered through the Saudi Commission for Health Specialties (SCFHS). RTs in Saudi Arabia are eligible to sit for an exam immediately after graduation from an accredited respiratory therapy program. Passing this exam allows them to be registered and classified according to their highest academic degree. Eligibility criteria included any SCFHS registered RTs and classified as respiratory therapy technician, respiratory therapy specialist, respiratory therapy senior specialist, or respiratory therapy consultant specialist. RT interns and students were excluded. We sampled participants using social media, including WhatsApp groups and Twitter.

Sample size

There was no information available to estimate the true population proportion of our outcomes of interest. Thus, we calculated an initial sample size (n=355) for this component based on conservative estimates of 0.5 population proportion of characteristics of interest within 5% of the true population value and 95% confidence level. A national survey of RTs in 2011 found that the total number of RTs in Saudi Arabia was 1,477.[64] Thus, we based our calculations on a conservative estimate of 4,500 for the total number of RTs population in Saudi Arabia, assuming that the total number of RTs have tripled over the past 10 years. Table 1 shows the required sample sizes with varying levels of precision and confidence for population sizes of 4,500. We added a contingency sample of 20% to the sample size calculated, yielding a target sample size of 426. The sample size was calculated using the following formula:

$$n = \frac{\dfrac{z^2 \times p(1-p)}{e^2}}{1 + \left(\dfrac{z^2 \times p(1-p)}{e^2 N}\right)}$$

$where\ n = sample\ size, N = population\ size, z = z\ score, and\ e$

$= margin\ of\ error$

Table 1. Required sample sizes with varying levels of precision and confidence for population size of 4,500

Precision	Confidence level			
	85	90	95	99
5%	199	257	355	580
10%	52	68	95	161
20%	13	17	24	42

Procedures

<u>*Instrument Development*</u>

We used the Global Adult Tobacco Survey (GATS) Core Questionnaire with Optional Questions (Individual Questionnaire) to examine tobacco use behaviors among RTs.[111] The GATS was developed by the U.S. Centers for Disease Control and Prevention (CDC) in collaboration with other organizations such as the WHO and has been previously administered in Saudi Arabia.[7] The GATS was developed to collect data on the following topics: cigarette, waterpipe, e-cigarette, and smokeless tobacco use behaviors; cessation behaviors; secondhand smoke exposure; tobacco-related knowledge, attitudes, and perceptions; media; and economics. We used an abbreviated version of the questionnaire focusing on the three most common tobacco products in Saudi Arabia

(cigarettes, waterpipe, and e-cigarettes) and modify it to fit our target population (Appendix A). Measures of interest are defined under *Measures* subsection.

We also used another questionnaire to examine the intention of provision and the provision of tobacco dependence treatment among RTs. This questionnaire follows the constructs of the theory of planned behavior (TPB) and has been previously used among health care providers (Appendix B). Measures of interest are defined under *Measures* subsection.

In addition to questions related to cigarettes, waterpipe, and e-cigarette use, the survey instrument included demographic, socioeconomic status, and level of nicotine dependence questions. Due to the modifications that we made to some of the questions on the survey instrument, we piloted the instrument on three RTs from Saudi Arabia through pre-arranged video-conference call meetings (Zoom).

Data Collection

Surveys were conducted online using Qualtrics, following Dillman's method (The Tailored Design Method) for internet surveys.[112] All participants received an initial invite through WhatsApp or Twitter to participate in a research study. The invitation included a description of the study, a brief summary about the researchers, the general purpose of the study, and eligibility criteria for the study. The invite also included a timeline to complete the survey within three weeks of receiving the email. Reminder messages to complete the survey were sent for those who did not start or did not complete the survey every 1-2 weeks. Surveys were optimized for computer and mobile phone use.

The invite contained an anonymous survey link for all participants. Clicking this link took the participants to the consent form, which included information related to the

study (purpose, length), its potential benefits and risks, and their rights as participants. Participants who provide consent were directed to start the survey.

Data collected electronically via Qualtrics were kept in Qualtrics until this component was completed. Data, then, were exported from Qualtrics and stored on the College of Public Health's secure server. Access to data was only available for approved study researchers.

Measures

Specific Aim 1 measures:

Tobacco use status of the participants was determined using the question, "Do you *currently* smoke [tobacco product: cigarettes/waterpipe/e-cigarette] on a daily basis, less than daily, or not at all?" Current daily users were those who answer "Daily" and current less than daily users were those who report "Less than daily." Former users were determined using this question "In the *past*, have you smoked tobacco on a daily basis, less than daily, or not at all?" Former daily users were those who answer "Daily" and former less than daily users were those who report "Less than daily." Never users were those who answer "Not at all" for the two previous questions.

Attempts to quit smoking and cessation behaviors for each tobacco product were measured using the following questions: "During the past 12 months, have you tried to stop smoking?" "During any visit to a doctor or health care provider in the past 12 months, were you asked if you smoke tobacco?" "During any visit to a doctor or health care provider in the past 12 months, were you advised to quit smoking tobacco?" and "Which of the following best describes your thinking about quitting smoking? I am planning to quit within the next month, I am thinking about quitting within the next 12

months, I will quit someday but not within the next 12 months, or I am not interested in quitting?" Nicotine dependence was assessed using the Heaviness of Smoking Index (HSI), which includes two questions on time to first cigarette and number of cigarettes smoked per day. We adapted the two questions to each of the three forms of tobacco products we investigated.

Knowledge related to tobacco harm was assessed using the following questions: "Based on what you know or believe, does smoking tobacco cause serious illness?" "Based on what you know or believe, does smoking tobacco cause the following: Stroke, Heart attack, Lung cancer, Diabetes, Emphysema, Asthma?" "Do you think that some types of cigarettes *could* be less harmful than other types, or are all cigarettes equally harmful? "Do you believe cigarettes are addictive?" Attitudes related to tobacco control policies were measured using the following questions: "Do you support or oppose the law that prohibits smoking in indoor workplaces and public places, such as restaurants and coffee shops?" "Do you favor or oppose increasing taxes on tobacco products?"

We also determined the following demographic factors: age, sex, marital status, education level, and household income. Additionally, we collected job characteristics including type of institution (private vs public sectors), current job title, years of experience, patient populations (adult, pediatric, or neonatal), and patient care level (ward, intensive, or long-term care). Figure 2 provides a summary of the primary measures for SA 1.

Figure 2. Summary of measures for Specific Aim 1

Demographics

- Age
- Sex
- Marital status
- Education
- Household income
- Job characteristics

Tobacco use related:

- Tobacco products use status
- Quit attempts
- knowledge of harm
- Attitudes towards tobacco interventions

Specific Aim 2 measures:

We used seven multiple choice questions to assess RTs' knowledge related to smoking and smoking cessation. These questions tested their knowledge related to smoking cessation counseling, its effects, and use of pharmacotherapy. For instance, one question asks about the percentage of smokers who say that they want to quit smoking in the future. Other questions examine the regimen of pharmacotherapies such as Varenicline. All ten questions are listed in Appendix B.

We established current behaviors related to provision of tobacco dependence treatment using ten Likert-type scale items that range from 1 (Never) to 5 (Always). These items covered the 5 A's model, including the measurement of extent of engaging in the following behaviors to promote smoking cessation among RTs' patients: asking about smoking status, assessing patient willingness to quit, advising patients to stop smoking, referral to other cessation services, recommending pharmacotherapy, providing

34

self-help materials, arrange for follow-up visits to address smoking, monitor progress in quit attempt, assessing medical chart to review smoking status, adding data to medical chart about cessation status or goals.

Intention to provide tobacco dependence treatment was assessed using the following question: "How often do you intend to provide smoking cessation advice in your clinical rotations to patients who smoke [tobacco product: cigarettes/waterpipe/e-cigarettes]?", assessed for each tobacco product separately with a Likert-type scale response options ranging from 0 (Never) to 10 (Always).

We used four statements with a Likert-type scale response options ranging from 1 (Strongly disagree) to 5 (Strongly agree) to measure *attitudes and outcome expectancies* towards offering tobacco dependence treatment to help patients quit smoking. We assessed attitudes using the following statements: 1) Counseling patients about smoking cessation can strengthen the RT-patient relationship and 2) I find that counseling patients about smoking cessation is personally rewarding. On the other hand, outcome expectancies were assessed using the following statements :1) Counseling patients about smoking cessation takes time away from more important tasks and 2) Most patients referred to smoking cessation programs derive little or no benefit.

Similar to attitudes and outcome expectancies, we used three statements with a similar Likert-type response options 1-5 (Strongly disagree to Strongly agree) to measure *social norms* related to the expectations of helping patients to quit smoking. These statements include: 1) My colleagues expect me to counsel smokers to quit, 2) My department has a specific policy of counseling smokers to quit, and 3) I feel a duty to counsel smokers to quit.

Also, *perceived behavioral control* was measured using five items that assessed perceived ability to help patients quit tobacco. These items followed a Likert-type response scale ranging from 1-5 (Strongly disagree to Strongly agree), which included 1) I am able to help smokers who want to quit even if they think it will be difficult to quit, 2) Helping my patients quit smoking is difficult to do at every visit, 3) I feel comfortable asking my patients about their smoking behaviors, 4) I know how to recommend medication for tobacco cessation (e.g., nicotine replacement/ bupropion/ varenicline), and 5) I believe I can provide counselling even when time is limited.

We also assessed perceived barriers among RTs that may impede their ability to provide tobacco dependence treatment to their patients using six statements, with response options on a scale of 1-3: Not a barrier (1), Somewhat of a barrier (2), or A significant barrier (3). These statements include: 1) Too few cessation programs are available, 2) Patients have more immediate problems to address, 3) Staff are unfamiliar with interventions to help smokers quit, 4) Reimbursement for therapist time is limited, 5) Patients are not motivated to quit, and 6) Patients usually fail to quit.

Sources of knowledge to prepare RTs to help patients quit smoking were assessed using three items, with scale response options of Not at all (1), Somewhat (2), and Very well (3). The sources were assessed using this question "How well did the following prepare you to help patients quit smoking?" with the following statements: 1) Undergraduate education (e.g., diploma or bachelor's degree), 2) Postgraduate education (e.g., master's degree or PhD), and 3) Continuing medical education (CME) or training. Figure 3 provides a summary of the primary measures for SA 1.

Figure 3. Summary of the primary measures for Specific Aim 2

Tobacco dependence treatment related:

- knowledge
- Provision of tobacco dependence treatment behaviors
- Intention to provide tobacco dependence treatment
- Attitude measures
  - Outcome expectancy measures
- Social norm measures
- Perceived behavioral control measures.
- Barriers to provision
- Sources of knowledge and training

Handling Missingness

In order to calculate the percentage of missing data in each variable, we excluded those who simply clicked on the survey link, as well as participants who did not at least begin the tobacco use sections. We utilized IP addresses to identify and remove duplicate entries, which resulted in a final sample size of 202 respondents. Responses with "prefer not to answer" or "I don't know" were set to missing if the response was not meaningful. Missingness ranged from 0.5% in education level to nearly 20% in knowledge of tobacco dependence treatment items. The only variables with no missing data were gender, income, marital status, and nationality.

To build an imputation model, we used the fully conditional specifications (FCS) method to impute tobacco use, and to account for the categorical nature of the outcome, we employed the discriminant function to avoid implausible results. In order to ensure the consistency and compatibility between our imputation model and the analytic model, we included all variables in the primary analysis model, as well as other variables that may

be associated with the outcomes, such as demographics (age, gender, income, marital status), job characteristics, knowledge of tobacco harm, attitudes towards tobacco interventions, intention to provide tobacco dependence treatment, and related behaviors and beliefs. We generated a total of 25 imputed datasets.

Data Analysis Plan for SA 1

SA 1: To determine tobacco use behaviors and predictors of tobacco use among registered RTs in Saudi Arabia.

Descriptive analyses:

SA 1 primarily focused on describing tobacco-related characteristics among RTs. The analyses described our primary outcomes, including current smoking status for each tobacco product of interest and knowledge of the harm associated with tobacco use. Current smoking status was defined as using [cigarette/waterpipe/e-cigarette] on daily or less than daily basis. The analyses described the prevalence of use of each tobacco product among our sample. We also provided descriptive statistics of the knowledge of the harm associated with tobacco products. Also, the primary outcomes were described by the demographic characteristics, including gender and education, of our sample.

Tests and modeling:

We also ran secondary analyses to determine the factors associated with each tobacco product use among RTs. Tobacco use was prevalent in our sample; therefore, to avoid overestimation of the strength of the associations, we use log-binomial regression models to determine the factors associated with tobacco use.[113] We used a literature-informed approach to identify potential factors associated with use of each tobacco product and used the purposeful selection method to identify which variable to include in

38

the final model: adding significant variables ($p<0.2$) in univariable testing to a multivariable model.[114] Variables with p>0.05 in the multivariable model were removed until all remaining variables are significant (p<0.05). We reported adjusted prevalence ratios (PR) along with their 95% confidence interval (CI) for all significant factors associated with tobacco use.

Data Analysis Plan for SA 2

SA 2: To determine attitudes, subjective norms, and perceived behavioral control related to delivering tobacco dependence treatments among registered RTs in Saudi Arabia.

Descriptive analyses:

SA 2 primarily focused on outcomes related to intention of providing tobacco dependence treatment. The measures in this Aim were following the TPB constructs. We assessed the internal consistency of each scale using Cronbach's coefficient alpha to ensure that the scale components were adequately correlated and that the grouped items measured the underlying construct. We provided descriptive statistics of every construct using means and standard errors. We described the correlation between every construct and the intention of providing tobacco dependence treatment for every tobacco product.

Tests and modeling:

Our primary analyses determined the significant factors associated with the intention of providing tobacco dependence treatment using linear regression models. The primary outcome—intention of providing tobacco dependence treatment—was treated as a continuous outcome. We used series of multiple linear regression models to examine the association between the intention to provide tobacco cessation counseling and independent variables. We created separate regression models and independent variables

were entered in blocks based on theoretical reasoning.[115] The first block included sociodemographics (including significant factors determined in SA 1) and tobacco use behaviors and perceptions, and the second block included measures related to TPB constructs. We assessed the model assumptions, including linearity, normality, and homoskedasticity. We also assessed collinearity using variance inflation factor (VIF) with a cutoff of 10.

Component II: Training in Tobacco Dependence Treatment

Participants and settings

Participants for the second component were recruited online using social media (i.e., private departmental WhatsApp groups). RT interns, RT students, and Administrative RTs who do not interact with patients were excluded. We used a convenience sampling strategy to recruit participants. We asked the RT department to designate a liaison for follow-up if feasible, but we did not require it.

Sample size

Given that SA 3 is a pilot study, our sampling method for SA 3 was convenience sampling method. However, we calculated the sample size (n=88) to detect conservative estimates of 0.3 effect size, 5% type 1 error rate, and 80% power, given that the true effect size of the intervention is unknown. Also, we based our calculations on an estimate of 1.0 for standard deviation of the change in the outcome. Given the paired design of Component II, sample size was determined for paired populations using the following formula (Approximation using the Z statistic):[116,117]

$$N = \frac{\left(Z_{\alpha/2} + Z_\beta\right)^2}{\left(\frac{E}{SD_\Delta}\right)^2} = \frac{(1.96 + 0.84)^2}{\left(\frac{0.3}{1}\right)^2} = 88$$

Procedures

Educational Training Program (Intervention)

This training program was tailored using a combination of existing resources to build a comprehensive training course. These resources are: 1) AARC's "Clinician's Guide to Treating Tobacco Dependence"[25] and 2) Rx for Change®,[26] an organization that has developed public use smoking cessation educational materials and videos for providers, including specific modules designed for RTs. This course was tailored to the specific findings from SA 1 and SA 2, emphasizing the importance of perceived behavioral control (i.e., how easy, relevant, and effective) in providing tobacco cessation counseling.

The training program was delivered through an online learning management system (LMS—Canvas) to allow flexibility for the participants to self-pace their progress. Through this LMS, participants were able to communicate any questions, concerns, or clarifications. We were also able to monitor participants' progress. Also, at the start of the training program, we requested an RT liaison from the RT departments if feasible. Participants progressed through a predetermined sequence until they complete all the required modules.

The training modules consisted of a combination of slides, videos, and tests with an estimated completion time of three hours. Before course implementation, we received Continuing Medical Education Accreditation from the SCFHS. Participants who

41

complete our program received 3 SCFHS-accredited CME hours, which was an added incentive to participate in our study.

Instrument Development and Measures

Each participant started with pre-training evaluation measures, followed by the training program modules, and ended with post-training evaluation measures. We used the same survey instrument and measures used in SA 1 and SA 2 before (Appendix C), immediately after (Appendix D), and one-month after (Appendix E) completing the training program to establish and examine the changes in tobacco use behaviors, knowledge of the harm associated with tobacco use, and attitudes, knowledge, and skills related to delivering tobacco dependence treatments. However, fixed measures and items that are not affected or related to the training program—such as demographics—were only included in the pre-training survey.

Additionally, we added other parts to the survey instrument. For pre-training, we added questions related to job characteristics (job title and start year as RT). For post-training, we added items related to satisfaction and other free-response questions, including description of what participants liked and did not like about the training program, recommendations to improve the training program, barriers faced to providing brief counseling to smokers, overall satisfaction with the training program (Very dissatisfied (1) to Very satisfied (5)), recommending the program to their patients or other health care providers (Yes or No [if no explain]).

To comprehensively assess the knowledge gained from the educational training modules, we developed a 10-questions knowledge test that was administered pre- and immediately post-training. The test was based on the training materials.

Data Collection

We coordinated with the administrative RTs to send an initial WhatsApp message to their private departmental WhatsApp group inviting RTs to participate in our training program. Within this message, participants were provided with a brief information about the study with a link. This link took them to a webpage with information related the study, its potential benefits and risks, and their rights as participants. Then they were prompted to complete an online consent and provide their contact information if they choose to participate. Participants who completed an online consent were subsequently prompted to sign up for our training program using their email address.

The message also included a timeline to complete all modules within one month of signing up. For Component II, all data collection instruments were conducted using Qualtrics with links sent through WhatsApp messages. Surveys and tests were optimized for computer and mobile phone use. Data quality checks and participants follow-up were conducted on a regular basis to maintain the timeline. Data collected electronically remained in Qualtrics until this component was completed. Data were also exported from Qualtrics and stored on the College of Public Health's secure server. Access to data was only available for approved study researchers.

Measures related to knowledge and attitudes such as perceived self-efficacy and intention to provide tobacco dependence treatment were collected immediately post-training, as determined by the sequence of the training modules. However, measures related to behaviors (tobacco use and provision of tobacco dependence treatment) were collected one-month following training completion (Figure 4).

Figure 4. Summary of measures and timeline of data collection for Specific Aim 3

Pre-training Measures

- Demographics
- Tobacco use related:
  - Use status
  - Age of initiation
  - Quit attempts
  - Pre- knowledge test
  - Tobacco interventions attitudes
- Tobacco dependence treatment related:
  - Pre- knowledge test
  - Provision behaviors
  - Intention to provide
  - Attitude measures
  - Outcome expectancy measures
  - Social norm measures
  - Perceived behavioral control measures.
  - Barriers to provision
  - sources of knowledge and training

Immediately Post-training Completion

- Tobacco use related:
  - Post- knowledge test
  - Tobacco interventions attitudes
- Tobacco dependence treatment related:
  - Post- knowledge test
  - Intention to provide
  - Attitude measures
  - Outcome expectancy measures
  - Social norm measures
  - Perceived behavioral control measures.
  - Barriers to provision

One-month Post-training Completion

- Tobacco use related items:
  - Use status
  - Quit attempts
- Tobacco dependence treatment related:
  - Provision behaviors

Analysis Plan for SA 3

SA 3: To tailor and pilot a smoking cessation training program for registered RTs in a hospital in Saudi Arabia.

SA 3 primarily focuses on the feasibility of our training program among RTs. We assessed the feasibility of the training program by examining changes in RTs' knowledge, skills, behaviors related to tobacco dependence treatment, completion, and satisfaction.

Descriptive analyses:

We started our descriptive analyses with the percentage of participants who completed the training program out of those who started. Additionally, in a similar

44

fashion to descriptive statistics of SA 1 and SA2, we provided pre- and post-training descriptive statistic of each outcome of interest. We described measures related to tobacco dependence treatment, including current behaviors related to provision of tobacco dependence treatment, measures of attitudes, social norm measures, perceived behavioral control measures, and barriers. We also provided descriptive statistics of the items related to satisfaction with the training program. We provided means and standard deviations for continuous measures (with %change) and percentages and frequencies for categorical measures.

Chapter 3. Prevalence and predictors of tobacco use among respiratory therapists in Saudi Arabia

Introduction

Tobacco use is a significant global health issue, causing over 8 million deaths annually, including 1.2 million deaths from secondhand smoke exposure. It is considered one of the most serious public health threats in history.[118] In Saudi Arabia, the prevalence of tobacco use, including cigarettes, waterpipe, and smokeless tobacco, has risen from 12.2% to 19.8% between 2013 and 2019, with particularly high prevalence among men (21.5% to 30.0% during the same period); yet the prevalence nearly quadrupled for women in that time (1.1% to 4.2%).[6,7,119] This increase in tobacco use has contributed to a high burden of smoking-related diseases, such as cancer and chronic obstructive disease (COPD), in the country, which is expected to continue to rise due to the persistence of high tobacco use rates and the aging population.[8-11] In addition, respiratory diseases related to tobacco use, such as lung cancer, tuberculosis, and COPD,[12-15] make up the fifth leading cause of death in Saudi Arabia, after external causes of morbidity and mortality, diseases of the circulatory system, perinatal conditions, and injury.[8]

Cigarettes are the most common tobacco product in Saudi Arabia, with a population-wide prevalence of 15.9% according to the Global Adult Tobacco Survey (GATS) in 2019.[7] This prevalence was higher among men (24.9%) than women (2.5%).[7]

Another commonly used tobacco product in Saudi Arabia is waterpipe (also known as hookah or shisha). The prevalence of waterpipe smoking has increased significantly in Saudi Arabia, with the prevalence more than doubling among men (3.3% to 7.3%) and nearly tripling among women (from 0.5% to 1.3%) between 2005 and 2013.[28,119] This trend appears to have continued, as the 2019 GATS estimated the prevalence of current waterpipe smoking to be 9.7% among men and 2.3% among women.[7] E-cigarettes have also gained popularity in Saudi Arabia, particularly among young adults.[45,46] The 2019 GATS estimated that the prevalence of ever using e-cigarettes (even just once) and currently using e-cigarettes on daily or less than daily basis was 3.1% (4.5% in men, 1.2% in women) and 0.8% (1.1% in men, 0.4% in women), respectively.[7]

Similar to the general population, the prevalence of current smoking among health care providers is high in Saudi Arabia. Multiple studies, albeit smaller and limited to certain regions, have consistently shown that tobacco use is common among physicians and other healthcare providers. The prevalence of tobacco use among primary care physicians in Saudi Arabia has been reported to be 16%-17%.[23,53] However, a study of hospital physicians found a higher prevalence of waterpipe smoking, with 45% of the sample overall reporting current use (58% among men and 18% among women).[54] Studies that have examined tobacco use among non-physician health care providers reported prevalence estimates ranging from 14.8% to 33.8%.[56,57]

Although there are many studies that examined tobacco use among health care providers in Saudi Arabia, there is limited research in tobacco use among respiratory therapists (RTs)—key health care professionals who interact with patients suffering from tobacco-related respiratory illnesses on a regular basis. RTs typically provide care to

cardiopulmonary patients in all hospital areas such as medical and surgical wards and intensive care units, emergency departments, and pulmonary labs and clinics. They also provide care to all patient populations ranging from premature babies to adults and geriatrics. RTs serve as role models for their patients and their tobacco use behaviors and perceptions may directly impact their smoking cessation counseling behaviors.[23] Further examination of RT's tobacco use is necessary to understand whether these behaviors play a role in impeding their willingness to provide tobacco cessation counseling. Thus, the aim of our study was to fill that gap in the literature and determine the prevalence and correlates of current tobacco use among RTs in Saudi Arabia. Identifying these factors can help inform tobacco control efforts and identify groups who may be at greater risk of tobacco use. Additionally, identifying these factors can inform interventions and support efforts to reduce tobacco use among RTs. Reducing tobacco use among RTs is important because it can help promote a healthy work environment, reduce the risk of tobacco-related illness among health care providers, and improve the overall health of the population.

Methods

Participants, procedures, and data collection

We conducted a cross-sectional study to examine tobacco use patterns and beliefs about, attitudes towards, knowledge of, and delivery of tobacco dependence treatments among RTs in Saudi Arabia. Participants were recruited using social media (e.g., WhatsApp and Twitter) between April 12, 2022 and June 14, 2022. We contacted

WhatsApp groups administrators with large numbers of RTs and Twitter accounts with large RT followers to provide them with an invite. The invite indicated that the data were collected for a study aiming to identify RT role in tobacco use and cessation with a link to our survey. Clicking the link takes the participants to our online survey that started with the consent form. After providing their consent, we screened participants using a question to identify their current job status. Eligible participants were RTs classified as a respiratory therapy technician, respiratory therapy specialist, respiratory therapy senior specialist, or respiratory therapy consultant specialist. RT trainees such as respiratory therapy students or interns were excluded.

The survey instrument was based on the GATS Core Questionnaire with optional questions (from the Individual Questionnaire) to examine tobacco use behaviors among RTs.[111] The GATS was developed by the U.S. Centers for Disease Control and Prevention (CDC) in collaboration with other organizations, such as the World Health Organization (WHO), and has been previously administered in Saudi Arabia.[7] The GATS was developed to collect data on the following topics: tobacco use history (cigarettes, waterpipe smoking, e-cigarettes, and smokeless tobacco); cessation behaviors; secondhand smoke exposure; tobacco-related knowledge, attitudes, and perceptions; media; and economics. We used a shorter version of the GATS Core Questionnaire focusing on the three most common tobacco products in Saudi Arabia (cigarettes, waterpipe, and e-cigarettes) and modified it to fit our target population (Appendix A). The survey also included questions about demographics, socioeconomic status, and level of nicotine dependence.

To ensure clarity, we translated the survey instrument to Arabic and back translated it to English. We presented the survey items to participants in both languages. We additionally piloted the instrument with three RTs from Saudi Arabia and received verbal feedback through pre-arranged videoconference meetings (Zoom).

Surveys were conducted online using Qualtrics, following Dillman's method (The Tailored Design Method) for internet surveys.[112] We sent an invitation message to social media groups and accounts with a large number of RTs. The invitation included a description of the study, a brief summary about the researchers, the general purpose of the study, and eligibility criteria for the study. It also included an anonymous link to the consent form, which included information related to the study (purpose, length), its potential benefits and risks, and rights as participants. Those who consented were directed to start the survey. Reminder messages to complete the survey were sent to the same social media groups every 1-2 weeks. At enrollment, all participants completed informed consent followed by the survey online. Participants received no financial incentives for completing the survey; however, we offered them an online course to obtain continuous medical education credits (CMEs).

Data were collected electronically via Qualtrics. Data were exported from Qualtrics when the survey period ended and stored on the researchers' secure server. Access to data was only available for approved study researchers.

Sample size

There was no information available to estimate the true population proportion of the prevalence of tobacco use. Thus, we calculated an initial sample size (n=355) for the survey based on conservative estimates of 0.5 population proportion of characteristics of

interest within 5% of the true population value and 95% confidence level. A national survey of RTs in 2011 found that the total number of RTs in Saudi Arabia were 1,477.[64] Thus, we based our calculations on a conservative estimate of 4,500 for the total number of RTs population in Saudi Arabia, assuming that the total number of RTs have tripled over the past 10 years. We added a contingency sample of 20% to the sample size calculated, yielding a final sample size of 426.

Measures

<u>Dependent variables</u>

We determined tobacco use status of the participants using the question "Do you *currently* smoke [tobacco product: cigarettes/waterpipe/e-cigarette] on a daily basis, less than daily, or not at all?" Current daily users were those who reported "daily" or "less than daily." Former users were determined using the question "In the *past*, have you smoked tobacco on a daily basis, less than daily, or not at all?" Former daily users were those who reported "daily" or "less than daily" but reported "not at all" to current smoking question. Never users were those who answered "not at all" for both questions.

<u>Independent variables and covariates</u>

Knowledge of tobacco harms was assessed using the following questions: "Based on what you know or believe, does smoking tobacco cause the following: Stroke, Heart attack, Lung cancer, Diabetes, Emphysema, Asthma?" We summed the responses to the six conditions, creating a sum score of harm knowledge. Participants were asked about their beliefs about addiction with the question, "Do you believe cigarettes/waterpipe/e-cigarette are addictive?" We also assessed the absolute harm of tobacco using "Based on

what you know or believe, does smoking tobacco cause serious illness?" Response options included yes, no, I don't know, and prefer not to answer.

Additionally, we assessed absolute harm of waterpipe using "Based on what you know or believe, does smoking waterpipe with tobacco cause serious illness?", and relative harm of waterpipe and e-cigarettes using "Compared to smoking cigarettes, do you think smoking waterpipe with tobacco is_____?" and "Compared to smoking ordinary cigarettes, would you say that using electronic cigarettes or any other vaping device is_____?", respectively. Response options for waterpipe relative harms included "Don't know, Less harmful than cigarettes, No different, More harmful than cigarettes, and Prefer not to answer" and response options for e-cigarette relative harm included " Don't know, Much less harmful than smoking ordinary cigarettes, A little less harmful than smoking ordinary cigarettes, About as harmful as smoking ordinary cigarettes, A little more harmful than smoking ordinary cigarettes, Much more harmful than smoking ordinary cigarettes, and Prefer not to answer."

We also asked about the following demographic factors: age, sex, marital status, nationality, education level, and household income. Additionally, we collected job characteristics including type of institution (private vs government sectors), years of experience, hospital's region or location, and typical number of hours per week.

Data analysis

<u>Missingness</u>

To determine the proportion of missingness in each variable, we removed those who only clicked on the survey link. Also, we removed participants who did not at least start the tobacco use sections. We used participants' IP addresses to determine duplicates

52

and remove them. These deletions resulted in 202 respondents included. Responses with "prefer not to answer" or "I don't know" were set to missing if the response was not meaningful. "I don't know" response to knowledge items was considered meaningful. Missingness ranged from 0.5% in education level to nearly 20% in knowledge of tobacco dependence treatment items. The only complete variables were gender, income, marital status, and nationality.

Imputation model

We multiply imputed tobacco use using the fully conditional specifications (FCS) method. Given the categorical nature of our outcome, we used the discriminant function to avoid implausible results. To maintain the congeniality and consistency of our imputation model with our analytic model, the imputation models included all variables in the primary analysis model, as well as other variables potentially related to the outcomes. These variables included: demographics (age, gender, income, marital status), job characteristics, knowledge of tobacco harm, attitudes towards tobacco interventions, intention to provide tobacco dependence treatment and its related behaviors and beliefs. We created a total of 25 imputed datasets.

Statistical analysis

To describe sample characteristics, we created cross-tabulations with percentages and standard errors. In addition, we conducted bivariate analyses using bivariate log-binomial regression models to test the association between each predictor and current tobacco use status. For the main analyses, we estimated the marginal pooled prevalence of each product of tobacco use, as well as by gender and education level.

To avoid overestimation of the strength of the associations, we used log-binomial regression models to determine the factors associated with each tobacco product use among RTs.[113] We used a literature-informed approach to identify potential factors associated with use of each tobacco product and used the purposeful selection method to identify which variable to include in the final model. To apply this method, we started with bivariate regression analyses for each predictor, with significance defined at p-value < 0.20, followed by a multivariable model with all significant factors. A variable was kept in the multivariable model at p-value < 0.05 or if its removal induced a coefficient estimate change >20% in other variables. Next, we added back the variables excluded from the univariable analyses to the multivariable model, one at a time, and each was assessed for statistical significance at p-value < 0.05. We pooled the parameter estimates from the 25 imputed datasets using log binomial regression models to estimate crude and adjusted prevalence ratios (PRs) for each current tobacco product use. In cases where the models had convergence issues, we switched the distribution to Poisson with robust variance. All analyses were conducted using SAS 9.4 (SAS Institute Inc., Cary, NC).

Ethics

The study was approved by the Institutional Review Board (or Ethics Committee) of The Ohio State University (protocol number 2021H0416, and date of approval January 03, 2022).

Results

Sample characteristics

A total of 335 participants clicked on the survey link. Of those 335, 79 (24%) participants did not pass the consent page, 35 (10%) participants were ineligible students and interns, and 19 (6%) who did not start the tobacco use section, leaving an analytic sample of 202 (60%). The majority of respondents were male (57.9%, SE 7.0%), married (61.4%, SE 6.9%), held a bachelor's degree (77.1%, SE 6.0%), worked in Riyadh (57.5%, SE 7.1%), were employed at government hospitals (78.7%, SE 5.8%), had been working for more than 40 hours per week (49.7%, SE 7.1%), and had incomes between SAR 10,001 and 15,000 (40%, SE 7.1%). The mean age was 34.1 (SE 0.6) years with an average experience of 10.1 (SE 0.6) years (Table 2).

The majority of respondents viewed cigarettes (95.2%, SE 3.1%), waterpipe (74.9%, SE 6.2%), and e-cigarettes (77.5%, SE 6.0%) to be addictive. Similarly, the majority found tobacco (96.0%, SE 2.8%) and waterpipe (90.9%, SE 4.1%) to cause serious illness. More than half of the participants indicated that waterpipe and e-cigarettes were as harmful as or more harmful than cigarette smoking (Table 3).

Prevalence of tobacco use

Among the tobacco products we examined, the highest prevalence of current use was for e-cigarettes (20.8%, SE 5.8%), followed by waterpipe (17.3%, SE 5.6%), and cigarettes (17.0%, SE 5.5%). Among female participants, the highest prevalence of current use was for waterpipe smoking (14.5%, SE 3.5%), followed by e-cigarette use (7.5%, SE 2.6%), and cigarette smoking (3.6%, SE 2.3%). However, the highest prevalence of current use among male participants was for e-cigarettes (30.5%, SE 5.5%), followed by cigarette smoking (26.7%, SE 5.3%), and waterpipe smoking (19.4%, 5.3%).

When we examined the prevalence of current tobacco use by gender and education, males and females who held a bachelor's degree followed the same order of the prevalence by gender overall. Females with a bachelor's degree had a waterpipe prevalence of 16.2% (SE 3.5%), e-cigarette prevalence of 8.4% (SE2.6%), and cigarette prevalence of 4.1% (SE2.4%). Males with a bachelor's degree had an e-cigarette prevalence of 36.8% (SE 5.1%), cigarette prevalence of 26.2% (SE 4.5%), and waterpipe prevalence of 17.8% (SE 4.8%). However, males with a postgraduate degree reported a different order of product prevalence: cigarette prevalence was the highest at 27.4% (SE 3.3%), followed by waterpipe prevalence of 22.1% (SE 5.2%), and e-cigarette prevalence of 18.5% (SE 2.8%). Among males with an associate degree, the prevalence of cigarette smoking and waterpipe smoking was the same (33.3%, SE 1.0%) (Table 4). There was no reported current e-cigarette use among associate degree holders in our sample.

Bivariate analyses of factors associated with current tobacco use

Bivariate analyses (Table 5) indicated that current cigarette smoking was associated with gender, with the proportion of current cigarette smoking among females being 0.13 times the prevalence of that among males (PR 0.13, 95% CI 0.03 – 0.51). With respect to employment status, those working in education reported a higher prevalence of current cigarette use than those working in governmental hospitals (PR 2.21, 95% CI 1.03 – 4.74). Work region was marginally significant, with those working in the Eastern Province having lower prevalence of current cigarette smoking than Riyadh (PR 0.41, 95% CI 0.16 – 1.00).

Current waterpipe smoking was significantly associated with waterpipe relative harm perceptions, as current waterpipe smoking was lower among those who had

increasingly higher harms of waterpipe compared to cigarettes (PR 0.49, 95% CI 31 –

0.78).

Current e-cigarette use was significantly associated with female gender (PR 0.24,

95% CI 0.11 – 0.55), working in education compared to governmental hospitals (PR 2.52,

95% CI 1.36, 4.69), and perceived relative harm of e-cigarette compared to cigarette

smoking (PR 0.65, 95% CI 0.53 – 0.81).

Multivariable analyses of factors associated with current tobacco use

Using the purposeful selection method, our final model showed that the only

factor that significantly predicted current cigarette smoking was gender. Similarly, factors

that significantly predicted e-cigarette use were female gender (PR = 0.28, 95% CI 0.12 –

0.68) and relative harm of e-cigarette (PR = 0.73, 95% CI 0.58 – 0.93). Additionally,

only one factor remained in our final model of predictors associated with current

waterpipe smoking, which was relative harm of waterpipe smoking (Table 6).

Discussion

Our study shed light on the prevalence and predictors of tobacco use among RTs

in Saudi Arabia. In our sample of RTs working in Saudi Arabia, current tobacco use was

common, with estimates highest for e-cigarette use, followed by waterpipe smoking, and

cigarette smoking. Different patterns existed by gender, with female RTs reporting

waterpipe as their most common tobacco product, followed by e-cigarettes, and

cigarettes. However, the most common product among male RTs was e-cigarettes,

followed by cigarettes, and waterpipe. Additionally, those who had higher risk

perceptions of e-cigarette use or waterpipe smoking, compared to cigarettes, were less likely to be current e-cigarette users or waterpipe smokers, respectively. These findings add to the literature on the prevalence and important predictors of the most prevalent tobacco products, including e-cigarettes, among RTs who specialize in management and treatment of respiratory and tobacco-related diseases.

The prevalence of current cigarette smoking in our sample was about 17.0% (26.7% in males, 3.6% in females), which is similar to the prevalence of cigarette smoking in the general population. The most recent population surveys (GATS) reported that the prevalence of current cigarette smoking was 15.9% (24.9% in males, 2.5% in females).[7] Similarly, results of surveys that examined the prevalence of current cigarette smoking among health care providers in Saudi Arabia paralleled our findings. A cross-sectional survey of health care providers, including allied health care workers, in Saudi Arabia found a prevalence of 18.4% for current cigarette smoking.[22] Another recent study that surveyed physicians in Riyadh showed higher prevalence of smoking, at 34.8% (70.4% in males, 29.6% in females).[55]

Our study provided new insight about the prevalence of waterpipe smoking and e-cigarette use among health care providers in Saudi Arabia. While most studies that examined waterpipe smoking behaviors in Saudi Arabia focused on young adults and medical and non-medical college students, only a few examined those behaviors among health care providers. The overall prevalence of current waterpipe smoking in our sample was higher than that of the general population.[7] Nevertheless, our results are comparable to the prevalence of current waterpipe smoking reported in studies among health care providers. For instance, a study among dentists found 26% current waterpipe smokers in

their sample (36.4% in males, 13.3% in females).[59] Another recent study among Saudi physicians found a higher prevalence of current waterpipe smoking, at 45% (58% in males, 18% in females).[54] Additionally, estimates of e-cigarette use—a recently introduced tobacco product in Saudi Arabia—are available at the general population level but not among health care professionals. Similar to waterpipe smoking, the prevalence of current e-cigarette use was higher in our sample than in the general population.[7]

Consistent with extant literature, our findings emphasize the importance of gender as important predictor of cigarette smoking among RTs in Saudi Arabia, with males having a higher prevalence of current smoking. While gender was the only factor associated with current cigarette smoking in our sample, other studies among the general population suggest that other demographic factors predict cigarette smoking, such as geographic region, marital status, education, occupation, and age.[120–122] However, different studies among health care providers found different factors associated with cigarette smoking. For instance, a study among physicians found that peer influences (i.e., smoking family member/friend), residency (medical) status, medical specialty, and being on-call increased the likelihood of smoking.[55] Another study among physicians found that gender, specialty, and years of work experience were associated with cigarette smoking.[23] Our findings suggest that tobacco control interventions targeting cigarettes and e-cigarettes may be tailored according to the target population's gender. However, our study did not explore the specific factors that influence tobacco use among men and women. Future studies should identify and leverage gender differences and tailor interventions to address those differences in current tobacco product use to reduce the tobacco burden in this population.

In addition to gender, our findings also highlight the importance of relative risk perceptions of e-cigarettes compared to cigarettes as a factor associated with e-cigarette use. Studies that examined the factors associated with e-cigarettes identified several factors including gender, age, peer use of tobacco, and believing that e-cigarettes could aid smoking cessation to be associated with e-cigarette use.[57,123–125] Also, our findings emphasize the importance of relative risk perceptions of waterpipe smoking compared to cigarettes, the only factor that predicted current waterpipe smoking in our sample. Similar to e-cigarettes, most studies examined waterpipe smoking behaviors have been among young adults and college students. However, a few studies conducted among health care providers (dentists and physicians) identified several factors associated with waterpipe smoking including, gender and cigarette smoking.[54,59] Our findings suggest that e-cigarette and waterpipe risk perceptions may serve as potential intervention targets among RTs in Saudi Arabia. Future studies should examine whether changing perceptions would reduce current waterpipe and e-cigarette use.

In general, methodological differences may contribute to differences in findings across studies, particularly the target population. While there were multiple studies that examined cigarettes smoking and its correlates among health care providers in Saudi Arabia, a smaller body of literature examined e-cigarette use and waterpipe smoking and their correlates among health care providers.

Strengths and limitations

Notable strengths of our study included the use of measures that were validated in the general population and piloted on several RTs in Saudi Arabia. Our survey instrument was translated and back translated and presented in Arabic and English to the participants

to improve clarity. However, it is important to keep in mind the limitations of the study when interpreting the findings. Our study was cross-sectional, so we cannot establish temporal associations between predictors and current tobacco use. We used a convenience sample of RTs and did not achieve our target sample size, which may limit the generalizability of our study estimates and findings to the RT population in Saudi Arabia. However, the demographic distribution of our sample (Table 3) was similar to the RT population in Saudi Arabia.[126] More representative and larger studies are needed to replicate these findings. The outcomes of our study were self-reported and were not validated with other objective measures such as cotinine measurement, which may have impacted our measured estimates.

Implications and recommendations

Our findings indicate gender differences in current cigarette smoking and e-cigarette use. This may indicate that interventions may benefit from tailoring interventions to gender differences in tobacco use. While recent studies suggest that Saudi women are socially driven to start smoking,[127] further studies are needed to identify those differences, especially among women working as health care providers who may face different challenges than the general population. Our analyses also indicated that those who had higher perceived risks of waterpipe smoking and e-cigarette use were less likely to be current users. Leveraging these key factors in the development of new interventions and refinement of existing interventions targeting tobacco use among this population may reduce the burden of current use in a population characterized by high prevalence of current tobacco use. For instance, risk messages can be tailored to men and women to elicit higher risk perception of tobacco use. The role of theories such as the

61

protection motivation theory and other models that examine multilevel factors, such as the social cognitive theory and social ecological model, should also be explored in this population. Individual level theories such as the protection motivation theory may guide messaging interventions by providing an insight on the role of cognitive factors such as risk appraisals and coping appraisals in tobacco use and cessation messaging among RTs in Saudi Arabia. Moreover, multilevel models such as the social ecological models may shed light on more effective approaches (e.g., institutional or ministry of health wide policies) that could incentivize tobacco cessation and integrate it within the health care work environment.

Conclusion

Our study examined tobacco use and its correlates among key health care professionals—RTs who regularly interact with patients suffering from tobacco-related illnesses. Future interventions should target RTs in Saudi Arabia to reduce their tobacco use, which may have the additional benefit of reducing tobacco use in the general population and encouraging more RTs to engage in tobacco control efforts. By identifying the prevalence and correlates of current tobacco use among RTs in Saudi Arabia, findings of this study can inform which factors might be best to target in interventions designed to reduce the burden of current tobacco use in this population.

Tables

Table 2. Demographic and work-related characteristics by tobacco use (N=202, % ± SE)

	Cigarette			**Waterpipe**			**E-cigarette**			**Overall**
	Non-smokers	Former smokers	Current smokers	Non-smokers	Former smokers	Current smokers	Non-users	Former users	Current users	
Gender										
Male	44.3 (6.5)	75.2 (5.3)	91.2 (5.9)	49.7 (6.9)	95.3 (4.7)	64.7 (5.5)	47.6 (6.4)	60.9 (4.6)	84.9 (5.5)	57.9 (7.0)
Female	55.7 (6.9)	24.8 (3.5)	8.8 (3.4)	50.3 (6.9)	4.7 (1.6)	35.4 (4.7)	52.4 (6.6)	39.1 (3.8)	15.1 (2.7)	42.1 (7.0)
Marital status										
No	38.0 (6.2)	43.6 (4.3)	35.5 (3.9)	39.0 (6.4)	38.6 (4.2)	37.3 (4.6)	39.4 (6.1)	37.4 (3.9)	37.5 (4.0)	38.6 (6.9)
Yes	62.0 (7.0)	56.4 (4.7)	64.5 (4.9)	61.0 (7.1)	61.4 (4.8)	62.7 (5.3)	60.6 (6.9)	62.6 (4.8)	62.5 (5.0)	61.4 (6.9)
Education										
Associate	3.8 (2.2)	2.7 (1.0)	2.9 (1.0)	4.2 (2.4)		2.9 (1.0)	4.1 (2.2)	5.1 (1.4)		3.5 (2.6)
Bachelor's	78.2 (7.1)	79.9 (5.1)	69.9 (4.9)	76.7 (7.1)	81.8 (6.1)	75.7 (5.7)	76.5 (7.1)	70.6 (5.0)	85.1 (5.5)	77.1 (6.0)
Postgraduate	17.9 (4.6)	17.4 (2.6)	27.2 (3.4)	19.0 (4.9)	18.2 (4.9)	21.4 (4.2)	19.4 (4.6)	24.3 (3.2)	14.9 (2.6)	19.4 (5.6)
Employment										
Government hospital	81.1 (7.1)	78.9 (5.2)	69.5 (4.9)	82.7 (7.1)	67.5 (5.6)	70.5 (5.2)	85.7 (7.1)	71.1 (5.0)	65.8 (5.0)	78.7 (5.8)
Non-govt hospital	11.1 (3.7)	14.5 (2.6)	12.0 (2.2)	9.4 (3.6)	14.3 (2.9)	20.2 (3.0)	8.3 (3.1)	20.4 (2.8)	14.3 (2.4)	11.9 (4.6)
Education	7.8 (3.1)	6.6 (1.9)	18.4 (2.8)	7.9 (3.3)	18.2 (3.4)	9.3 (2.8)	6.1 (2.7)	8.5 (2.1)	19.9 (3.0)	9.4 (4.2)
Income (SAR)										
< 5000 - 10000	29.8 (5.7)	35.5 (3.9)	26.1 (4.7)	1.0 (1.3)	31.6 (6.1)	29.8 (4.4)	32.9 (5.8)	25.5 (3.5)	27.1 (3.8)	30.2 (6.6)
10001 – 15000	39.1 (6.3)	37.9 (4.2)	45.5 (5.1)	40.3 (6.6)	40.3 (4.6)	38.1 (4.5)	35.2 (6.0)	50.6 (4.6)	43.8 (4.7)	40.0 (7.1)
15001 – 20000	19.1 (4.9)	15.5 (3.6)	21.6 (4.4)	18.9 (5.0)	23.2 (4.2)	15.9 (3.8)	21.5 (4.9)	10.8 (2.3)	18.8 (3.7)	18.9 (5.6)
> 20000	12.0 (4.0)	11.1 (2.4)	6.9 (2.2)	9.2 (3.7)	13.7 (4.1)	16.3 (3.0)	10.5 (3.7)	13.1 (2.4)	10.3 (2.5)	11.0 (4.5)
Region										
Riyadh	54.5 (6.9)	52.5 (4.6)	74.5 (5.1)	60.5 (7.2)	42.3 (4.7)	56.0 (5.4)	61.7 (7.0)	53.3 (4.4)	49.2 (4.4)	57.5 (7.1)
Eastern Province	32.3 (5.9)	31.4 (3.7)	15.4 (2.5)	30.3 (5.9)	34.1 (4.0)	21.1 (4.0)	25.7 (5.2)	38.3 (3.9)	30.9 (3.6)	29.2 (6.5)
Other regions	13.3 (4.1)	16.1 (2.9)	10.2 (2.3)	9.2 (3.6)	23.5 (3.6)	22.9 (3.6)	12.6 (3.8)	8.5 (2.1)	19.9 (3.0)	13.3 (4.9)
Hours per week										

	Cigarette			Waterpipe			E-cigarette			Overall
	Non-smokers	Former smokers	Current smokers	Non-smokers	Former smokers	Current smokers	Non-users	Former users	Current users	
0-30	26.6 (5.4)	25.8 (3.9)	32.9 (3.8)	24.8 (5.5)	43.2 (4.9)	27.6 (4.3)	27.2 (5.3)	2.8 (3.4)	31.0 (3.8)	5.6 (3.3)
31-40	21.9 (5.0)	18.9 (3.3)	30.5 (3.6)	23.3 (5.3)	17.5 (4.1)	24.3 (4.3)	21.8 (4.8)	27.4 (3.5)	21.1 (3.4)	22.8 (6.0)
41+	51.6 (6.7)	55.3 (4.9)	36.7 (4.1)	52.0 (6.9)	39.4 (4.9)	48.1 (5.3)	51.0 (6.6)	47.8 (4.5)	47.9 (4.7)	49.7 (7.1)
Age (Mean, SE)	34.1 (0.7)	33.6 (1.2)	34.4 (1.3)	34.7 (0.7)	31.5 (1.6)	33.4 (1.4)	35.3 (0.8)	33.2 (1.3)	31.5 (1.1)	34.1 (0.6)
Years of experience (Mean, SE)	10.4 (0.7)	9.1 (1.2)	10.1 (1.5)	10.7 (0.7)	8.0 (1.80)	9.1 (1.4)	11.2 (0.7)	8.8 (1.2)	8.2 (1.3)	10.1 (0.6)

Table 3. Addiction and health harm risks by tobacco use (N=202, % ± SE)

	Cigarette			Waterpipe			E-cigarette			Overall
	Non-smokers	Former smokers	Current smokers	Non-smokers	Former smokers	Current smokers	Non-users	Former users	Current users	
Risk of cig addiction										
Yes	94.6 (7.0)	98.2 (5.9)	94.6 (5.6)	94.3 (6.7)	99.2 (5.0)	96.1 (5.5)	93.0 (7.1)	99.9 (5.7)	97.4 (5.8)	95.2 (3.1)
No	5.4 (2.7)		5.4 (2.4)	5.9 (2.8)		3.9 (1.8)	7.1 (2.9)		2.6 (1.2)	4.8 (2.7)
Risk of WP addiction										
Yes	78.2 (7.2)	69.5 (5.9)	68.7 (5.0)	75.2 (7.2)	91.0 (5.5)	62.4 (5.2)	74.6 (7.2)	78.0 (5.3)	72.9 (5.4)	74.9 (6.2)
No	21.8 (5.1)	30.5 (4.8)	31.3 (3.8)	24.8 (5.5)	9.0 (3.6)	37.6 (4.4)	25.4 (5.2)	21.9 (3.3)	27.1 (3.6)	25.1 (5.1)
Risk of EC addiction										
Yes	79.0 (7.2)	75.7 (5.2)	73.7 (5.0)	76.7 (7.2)	85.4 (6.3)	75.1 (5.6)	72.0 (7.1)	88.6 (5.6)	82.8 (5.5)	77.5 (6.0)
No	21.0 (5.0)	24.3 (3.4)	26.4 (3.3)	23.3 (5.4)	14.6 (5.0)	24.9 (4.1)	28.0 (5.4)	11.4 (2.6)	17.2 (2.9)	22.5 (4.5)
Risk of serious disease (tobacco)										
Yes	95.0 (7.0)	97.9 (5.8)	98.2 (5.7)	96.6 (6.7)	92.5 (5.2)	963 (5.5)	96.5 (7.1)	96.6 (5.7)	94.3 (5.8)	96.0 (2.8)
No	5.0 (2.6)			3.4 (2.2)	7.5 (2.8)	3.7 (1.8)	3.5 (2.1)	3.5 (1.7)	5.7 (1.9)	4.0 (2.4)
Risk of serious disease (waterpipe)										
Yes	91.5 (7.0)	91.5 (5.4)	88.0 (5.2)	91.9 (6.9)	97.0 (5.3)	82.4 (5.2)	91.7 (7.1)	91.8 (5.6)	87.8 (5.6)	90.9 (4.1)
No	8.5 (3.3)	8.5 (2.0)	12.0 (2.3)	8.1 (3.4)		17.6 (2.9)	8.3 (3.2)	8.2 (2.2)	12.2 (2.4)	9.1 (2.3)
Waterpipe relative harm to cigarettes										
Don't know	9.4 (3.5)	11.8 (2.6)	5.1 (2.8)	10.6 (3.9)	90 (2.4)	3.5 (1.8)	9.8 (3.4)	8.4 (2.1)	7.9 (2.4)	9.1 (4.2)
Less harmful	4.6 (2.5)	13.1 (3.2)	4.2 (2.1)	2.7 (2.2)	8.2 (3.6)	18.6 (3.1)	3.1 (2.0)	11.2 (2.5)	10.1 (2.3)	6.1 (3.5)
No different	44.6 (6.5)	40.9 (5.8)	46.9 (5.3)	46.4 (6.8)	25.4 (5.1)	49.2 (5.7)	50.0 (6.6)	30.8 (4.0)	40.7 (4.5)	44.3 (7.1)
More harmful	41.4 (6.4)	34.1 (4.8)	43.9 (5.5)	40.4 (6.5)	57.5 (5.7)	28.7 (5.6)	37.1 (6.0)	49.6 (4.9)	41.3 (4.7)	40.4 (7.1)

	Cigarette			Waterpipe			E-cigarette			Overall
	Non-smokers	Former smokers	Current smokers	Non-smokers	Former smokers	Current smokers	Non-users	Former users	Current users	
E-cigarette relative harm to cigarettes										
Don't know	15.4 (4.3)	17.8 (3.0)	12.0 (3.1)	17.1 (4.8)	9.0 (3.3)	12.2 (3.0)	21.2 (4.8)	6.5 (2.5)	6.4 (2.3)	15.3 (5.2)
Much less	7.2 (3.1)	20.6 (3.3)	22.3 (3.6)	8.4 (3.6)	28.0 (4.4)	16.2 (3.8)	6.7 (2.9)	8.1 (2.0)	32.0 (4.0)	12.2 (4.7)
A little less	19.8 (4.9)	9.5 (2.5)	15.9 (2.7)	17.6 (4.8)	23.6 (3.8)	11.3 (3.4)	15.8 (4.3)	13.4 (2.7)	24.8 (3.5)	17.2 (5.4)
About as harmful	28.9 (5.7)	36.5 (4.0)	26.3 (3.7)	29.5 (5.9)	20.7 (4.0)	38 (4.3)	26.8 (5.4)	49.6 (4.5)	20.2 (3.2)	29.9 (6.6)
A little more	9.6 (3.5)	5.7 (1.7)	15.2 (2.9)	8.6 (3.5)	5.9 (2.6)	18.1 (3.1)	8.8 (3.3)	14.4 (2.7)	8.5 (2.5)	9.8 (4.3)
Much more	10.1 (4.8)	9.9 (2.8)	8.3 (2.5)	18.9 4.9)	12.9 (2.5)	4.2 (1.9)	20.6 (4.8)	8.1 (2.0)	8.3 (2.2)	15.6 (5.2)
Harm knowledge score (1-6)	4.5 (0.1)	4.6 (0.2)	4.6 (0.2)	4.6 (0.1)	4.1 (0.3)	4.6 (0.2)	4.6 (0.1)	4.4 (0.2)	4.4 (0.2)	4.5 (0.1)

Blank cells indicate no participants in some of the imputed datasets under specific categories

Table 4. Prevalence of current and former tobacco use by gender and education (% ± SE)

	Education						Gender		Overall
	Associate		Bachelor's		Postgraduate		Male	Female	
	Male	Female	Male	Female	Male	Female			
Cigarette smoking									
Current	33.3 (1.0)		26.2 (4.5)	4.1 (2.4)	27.4 (3.3)		26.70 (5.25)	3.6 (2.3)	17.0 (5.5)
Former	33.3 (1.0)		25.6 (4.6)	12.3 (3.4)	19.1 (2.9)		23.89 (5.09)	10.9 (3.3)	18.4 (5.7)
Waterpipe smoking									
Current	33.3 (1.0)		17.8 (4.8)	16.2 (3.5)	22.1 (5.2)		19.41 (5.27)	14.5 (3.5)	17.3 (5.6)
Former			23.8 (5.0)	1.5 (1.2)	13.4 (5.0)		20.14 (5.31)	1.4 (1.2)	12.2 (5.0)
E-cigarette use									
Current			36.8 (5.1)	8.4 (2.6)	18.5 (2.8)		30.50 (5.47)	7.5 (2.6)	20.8 (5.8)
Former	66.7 (1.4)		18.0 (3.7)	17.6 (3.6)	22.1 (3.1)	38.7 (3.1)	20.41 (4.64)	18.0 (3.8)	19.4 (5.7)

Blank cells indicate no participants in some of the imputed datasets under specific categories

Table 5. Bivariate analyses of factors associated with current tobacco use

	Current cigarette smoking			Current waterpipe smoking			Current e-cigarette smoking		
	PR	95% CI	*P*-value	PR	95% CI	*P*-value	PR	95% CI	*P*-value
Gender									
Male	Ref.			Ref.			Ref.		
Female	0.13	0.03, 0.51	**<0.01**	0.75	0.37, 1.51	0.42	0.24	0.11, 0.55	**<0.01**
Marital status									
No	Ref.			Ref.			Ref.		
Yes	1.14	0.59, 2.22		1.06	0.54, 2.08	0.87	1.05	0.60, 1.85	0.87
Education									
Associate	Ref.			Ref.			Ref.		
Bachelor's	1.07	0.17, 6.90	0.94	1.18	0.18, 7.59	0.86			
Postgraduate	1.66	0.25, 11.14	0.60	1.32	0.18, 9.44	0.78			
Employment									
Gov. hospital	Ref.			Ref.			Ref.		
Non-gov. hospital	1.14	0.43, 3.01	0.79	1.90	0.90, 4.00	0.09	1.44	0.66, 3.11	0.36
Education	2.21	1.03, 4.74	**0.04**	1.08	0.33, 3.60	0.90	2.52	1.36, 4.69	**<0.01**
Income	0.99	0.70, 1.38	0.94	1.09	0.77, 1.54	0.61	1.02	0.76, 1.36	0.90
Region									
Riyadh	Ref.			Ref.			Ref.		
Eastern Province	0.41	0.16, 1.00	0.05	0.74	0.30, 1.78	0.50	1.24	0.66, 2.31	0.50
Other regions	0.59	0.20, 1.75	0.34	1.77	0.83, 3.79	0.14	1.75	0.87, 3.52	0.12
Number of hours / week	0.79	0.55, 1.12	0.18	0.98	0.67, 1.43	0.90	0.93	0.68, 1.28	0.65
Age	1.00	0.97, 1.04	0.81	0.99	0.95, 1.03	0.62	0.96	0.92, 0.99	0.02
Years of experience	1.00	0.96, 1.04	0.99	0.98	0.94, 1.03	0.47	0.97	0.93, 1.01	0.09

	Current cigarette smoking			Current waterpipe smoking			Current e-cigarette smoking		
	PR	95% CI	*P*-value	PR	95% CI	*P*-value	PR	95% CI	*P*-value
Risk of cigarette addiction									
No	Ref.			Ref.			Ref.		
Yes	0.93	0.18, 4.83	0.93	1.31	0.22, 7.92	0.77	1.94	0.30, 12.52	0.49
Risk of waterpipe addiction									
No	Ref.			Ref.			Ref.		
Yes	0.74	0.37, 1.46	0.38	0.56	0.29, 1.07	0.08	0.90	0.48, 1.67	0.74
Risk of e-cigarette addiction									
No	Ref.			Ref.			Ref.		
Yes	0.81	0.40, 1.65	0.57	0.88	0.41, 1.91	0.75	1.40	0.67, 2.95	0.38
Risk of serious disease (waterpipe)									
No	Ref.			Ref.			Ref.		
Yes	0.73	0.29, 1.86	0.51	0.47	0.21, 1.03	0.06	0.72	0.32, 1.62	0.43
Waterpipe relative harm to cigarettes	0.95	0.62, 1.47	0.83	0.49	0.31, 0.78	**<0.01**	0.90	0.61, 1.33	0.60
E-cigarette relative harm to cigarettes	0.85	0.69, 1.06	0.16	0.90	0.74, 1.11	0.32	0.65	0.53, 0.81	**<0.01**

	Current cigarette smoking			Current waterpipe smoking			Current e-cigarette smoking		
	PR	95% CI	*P*-value	PR	95% CI	*P*-value	PR	95% CI	*P*-value
Harm knowledge score	1.03	0.79, 1.34	0.84	1.07	1.15, 0.81	0.62	0.92	0.74, 1.14	0.44

Blank cells indicate no participants in some of the imputed datasets under specific categories

Table 6. Multivariable analyses of factors associated with current tobacco use

	Current cigarette use			Current waterpipe use			Current e-cigarette use		
	PR	95% Confidence Limits		PR	95% Confidence Limits		PR	95% Confidence Limits	
Gender									
Male	Ref						Ref		
Female	0.127	0.031	0.513				0.284	0.119	0.679
Waterpipe relative harm				0.507	0.307	0.835			
E-cigarette relative harm							0.730	0.577	0.925

PR: prevalence ratio

Chapter 4. Correlates of intention to provide tobacco cessation counseling among

respiratory therapists in Saudi Arabia: Implications for practice and education

Introduction

The Saudi government and Ministry of Health (MoH) have taken various steps to

address tobacco use as a major public health concern in the country, in line with their

2030 objectives of enhancing the quality and efficiency of health and preventive care

services.[1,3] Among the measures taken are the implementation of a 100% excise duty

sales tax on tobacco products and increasing the number of MoH-tobacco cessation

clinics that offer free counseling and medications (from 160 clinics in 2017 to 542 clinics

in 2019).[3] However, despite these efforts, smoking in Saudi Arabia continues to rise, in

contrast to a decline in other high-income countries.[4,5] National surveys show that the

prevalence of tobacco use has grown from 12.1% to 17.9% (23.7%-27.5% in men, 1.4%-

3.7% in women) between 2013 and 2019.[5–7] The burden of smoking-related diseases such

as lung cancers and chronic obstructive pulmonary disease (COPD) is high and is

expected to continue to increase with the persistent smoking prevalence and an aging

population.[8,10,11,128] Furthermore, recent reports from the Saudi MoH indicate that

combined respiratory diseases are the fifth leading cause of death.[8] This high burden of

tobacco use calls for increased engagement from healthcare providers in tobacco control

efforts.

In-hospital tobacco dependence treatment has proven to be effective and, as such, hospital admission represents a great opportunity for healthcare providers to address tobacco use.[16,75] With Saudi hospitals being smoke-free,[17] smokers usually experience temporary abstinence during their hospital stay. This also provides a window where patients may be more receptive to treatment and motivated to quit smoking due to a decline in their health status. However, only about half of smokers in Saudi Arabia reported receiving advice to quit smoking from a healthcare provider during their visit to a doctor or other health professional in the past 12 months.[5,6]

Respiratory therapists (RTs) have a unique opportunity to address tobacco use in a clinical setting, as they frequently treat cardiopulmonary patients and interact with a high-risk population.[18] RTs also have significant experience interacting with smokers, who make up most of their patients.[19] However, in Saudi Arabia, RTs rarely provide tobacco dependence treatment to patients and the reasons for this are unclear. Health care providers in general face many challenges to providing tobacco dependence treatment such as lack of training, poor counseling skills, and low knowledge.[20,21] Additionally, RTs may use tobacco themselves, potentially impacting their willingness to provide treatment. Furthermore, a lack of training may be a significant challenge to providing tobacco dependence treatment, which is a challenge reported among RTs in the United States.[18]

Research to inform interventions targeting tobacco cessation counseling among RTs in Saudi Arabia, especially potentially modifiable factors such as subjective norms, attitudes, and perceived behavioral control, is very limited. To advance this research area, our aim was to examine correlates of intention to provide tobacco cessation counseling

among RTs in Saudi Arabia. Intention to provide tobacco cessation counseling is a good measure of engaging in in this behavior. Our study design was guided by the theory of planned behavior (TPB), a commonly used theory to examine health-related behaviors, particularly among clinicians.[91–100] The TPB is a health behavior model that predicts intention, which is the single most important and proximal determinant of behavior under volition.[88–90,129] The model includes three primary constructs: (1) *attitudes* (i.e., personal evaluation of tobacco dependence treatment, from positive to negative), (2) *subjective norms* (i.e., perception of how others perceive tobacco dependence treatment), and (3) perceived behavioral control (i.e., *perception of the ease or difficulty* of performing tobacco dependence treatment). In our analysis, we examined how demographics, tobacco use behaviors and perceptions, attitudes, subjective norms, and perceived behavioral control are associated with RTs' intention of providing tobacco dependence treatment. As predicted by the TPB model, we hypothesized that the intention to engage in tobacco cessation counseling would be predicted by attitudes, subjective norms, and perceived behavioral control. This, in turn, would identify potential determinants of provision of tobacco cessation counseling among RTs in Saudi Arabia.

Methods

Participants and procedures

We examined several aspects of tobacco use and cessation among RTs in Saudi Arabia, including tobacco use patterns and beliefs about, attitudes towards, knowledge of, and delivery of tobacco dependence treatments using a cross-sectional survey design. Our

recruitment strategy was online through social media platforms (e.g., WhatsApp and Twitter) from April 12, 2022 to June 14, 2022. Eligibility criteria included RTs who were classified as a respiratory therapy technician, respiratory therapy specialist, respiratory therapy senior specialist, or respiratory therapy consultant specialist. This classification is based on their highest education according the Saudi Commission for Health Specialties classification regulations. Respiratory therapy students or interns were ineligible to participate. The study was approved by the Institutional Review Boards (IRB) of The Ohio State University (protocol number 2021H0416, and date of approval January 03, 2022).

Our survey was based on the Global Adult Tobacco Survey (GATS), which was developed by the U.S. Centers for Disease Control and Prevention (CDC) in collaboration with the World Health Organization (WHO) and has been used in Saudi Arabia.[7,111] The GATS questionnaire includes questions about tobacco use behaviors, cessation behaviors, exposure to secondhand smoke, knowledge, attitudes, and perceptions about tobacco, media, and economics. We used a shortened version of the GATS questionnaire, which focuses on the three most common tobacco products in Saudi Arabia (cigarettes, waterpipe, and e-cigarettes) and was modified to fit our target population of respiratory therapists. (Appendix A).

An additional section of the survey explored the intention and actual provision of tobacco dependence treatment among respiratory therapists. This questionnaire was based on the TPB and has previously been used to study the behaviors of healthcare providers (Appendix B). Additionally, the survey instrument included questions about demographics, socioeconomic status, and level of nicotine dependence.

To ensure that the survey instrument was clear and accurate, we translated it into Arabic, back-translated it into English, and then presented the survey items in both languages to participants. After modifying the survey, we piloted the instrument on three RTs from Saudi Arabia through pre-arranged videoconference meetings (Zoom) and implemented their feedback.

Data collection

The survey was conducted online using Qualtrics, following Dillman's Tailored Design Method for internet surveys.[112] The researchers sent an invitation message to social media groups and accounts with a large number of RTs. The invitation included information about the study, the researchers, the purpose of the study, and the eligibility criteria. It also included a link to a consent form that provided information about the study, its potential benefits and risks, and the participants' rights. Those who agreed to participate were directed to the survey. Reminder messages were sent every 1-2 weeks to those social media groups to encourage participation. All participants completed informed consent before starting the survey. Participants were not given any financial incentives for completing the survey, but they were offered an online course about tobacco cessation counseling to earn free continuing medical education credits (CMEs).

The data collected through the online survey was stored on Qualtrics until the survey period ended. It was then exported and stored on a secure server at the Ohio State University College of Public Health (OSU CPH). Access to the data was restricted to approved study researchers.

Measures

<u>*Dependent variables*</u>

Intention to provide tobacco cessation counseling. We measured intention to provide tobacco cessation counseling using the average of three items (Cronbach's α = 0.89). The participants were asked "On a scale of 0 to 10, with 0 being "never" and 10 being "always," how often do you intend to provide smoking cessation advice in your clinical rounds to patients who smoke [cigarettes/waterpipe/e-cigarettes]?" Response options for all three items ranged from 0 to 10.

Independent variables and covariates

Sociodemographics and Tobacco use behaviors and perceptions. We assessed sociodemographic factors, including age, sex, marital status, nationality, education level, and household income. We defined dual tobacco use as current use (daily or less than daily) of any combination of 2 tobacco products including cigarettes, waterpipe, and e-cigarettes. We also defined any tobacco use as current use (daily or less than daily) of any of the three tobacco products we examined. We assessed relative harm of waterpipe and e-cigarettes using "Compared to smoking cigarettes, do you think smoking waterpipe with tobacco is_____?" and "Compared to smoking ordinary cigarettes, would you say that using electronic cigarettes or any other vaping device is_____?", respectively. Response options for waterpipe relative harms included Don't know, Less harmful than cigarettes, No different, More harmful than cigarettes, and Prefer not to answer and response options for e-cigarette relative harm included Don't know, Much less harmful than smoking ordinary cigarettes, A little less harmful than smoking ordinary cigarettes, About as harmful as smoking ordinary cigarettes, A little more harmful than smoking ordinary cigarettes, Much more harmful than smoking ordinary cigarettes, and Prefer not to answer.

TPB Constructs. We defined attitudes toward tobacco cessation counseling using the average of four items (Cronbach's α = 0.84). The participants were asked To what extent do you agree or disagree with the following statements about helping your patients quit smoking: "1) I enjoy counseling patients about smoking cessation," "2) I think counseling patients about smoking cessation is important," "3) Counseling patients about smoking cessation can strengthen the RT-patient relationship," and "4) I find that counseling patients about smoking cessation is personally rewarding." Similarly, we defined perceived behavioral control using the average of four items (Cronbach's α = 0.70). The participants were asked to what extent the agree or disagree with the following statements: "1) I am able to help smokers who want to quit even if they think it will be difficult to quit," "2) I feel comfortable asking my patients about their smoking behaviors," "3) I know how to recommend medication for tobacco cessation (e.g., nicotine replacement/ bupropion/ varenicline)," and "4) I believe I can provide counselling even when time is limited." Additionally, we used three items to capture subjective norms, in which the participants were asked to what extent the agree or disagree with: "1) My colleagues expect me to counsel smokers to quit," "2) My department has a specific policy of counseling smokers to quit," and "3) I feel a duty to counsel smokers to quit." However, we did not use the average of these three items due to their low internal consistency (Cronbach's α = 0.49). Response options to all the TPB items included a 5-point Likert-type scale ranging from "Strongly disagree" to "Strongly agree."

Data analysis

<u>Missingness</u>

To determine the proportion of missingness in each variable, we removed those who only clicked on the survey link. Also, we removed participants who did not at least start the tobacco use sections. We used participants' IP addresses to determine duplicates and remove them. These deletions resulted in a final sample of 202 observations. Responses with "I don't know" were set to missing if the response was not meaningful. In particular, the "I don't know" response to the knowledge questions were considered meaningful and were not set to missing. Item missingness ranged from 0.5% in education level to nearly 20% in knowledge of tobacco dependence treatment items. The only variables with no missing data were gender, income, marital status, and nationality.

Imputation model

Consistent with the imputation method we used in Chapter 3, we multiply imputed the variables with missing data using fully conditional specifications (FCS). We used the discriminant function for imputing all variables given the categorical nature of the survey items. To ensure that our imputation model congenial and consistent with our analytic model, the imputation models included the same variables that are in our analytic model, and additional variables potentially related to our outcomes. These variables included: intention to provide tobacco [cigarettes, waterpipe, e-cigarettes] cessation counseling and its related behaviors and beliefs, tobacco use, demographics (age, gender, income, marital status, region), job characteristics, knowledge of tobacco harm, and attitudes towards tobacco interventions. Additionally, we created a total of 25 imputed datasets.

Statistical analysis

We characterized the sample using descriptive statistics and used bivariate analyses to assess associations between our outcomes of interest and sociodemographics, tobacco use behaviors and perceptions, and the TPB constructs using bivariate linear regression models. We used series of multiple linear regression models to examine the association between the intention to provide tobacco cessation counseling and independent variables. We created separate regression models and independent variables were entered in blocks based on theoretical reasoning.[115] The first block included sociodemographics and tobacco use behaviors and perceptions, and the second block included measures related to TPB constructs. We reported model summary statistics, including R^2 and adjusted R^2 values, F values, and beta coefficients for each independent variable; significance level was set at $p < 0.05$. Pooled R2 was averaged across the 25 imputed datasets.[130] We checked all model assumptions, and all analyses were conducted using SAS 9.4 (SAS Institute Inc., Cary, NC).

Results

Participant characteristics

Our final analytic sample included 202 RTs. The majority of respondents were male (57.9%, SE 7.0%), Saudi (74.8%, SE 6.2%), married (61.4%, SE 6.9%), with bachelor's degree (77.1%, SE 6.0%), with income between SAR 10,001 and 15,000 (40%, SE 7.1%), and working in Riyadh (57.5%, SE 7.1%). About 15.3% of participants were dual tobacco (any combination of cigarettes, waterpipe, or e-cigarette) users and 35.7% were any tobacco (cigarettes, waterpipe, or e-cigarette) users. The mean age was

34.1 (SE 0.6) years. Additionally, the mean waterpipe and e-cigarette relative harm to cigarettes were 2.53 (SE 0.1) and 3.45 (SE 0.1), respectively (Table 7).

Bivariate analysis

The overall mean intentions to provide cessation counseling to tobacco users was 6.27 (SE 0.23, scale 0-10). Bivariate analyses (Table 8) indicated no differences by tobacco use behaviors or sociodemographic characteristics differences in intention to counsel cigarettes smokers and waterpipe smokers, with the exception of gender and job region: males had higher intention to counsel tobacco users than females ($p = 0.01$), and those working in other regions, compared to Riyadh, had higher intention to provide tobacco cessation advice ($p = 0.03$). With respect to the TPB constructs, nearly all components were positively associated with intention to provide advice to tobacco users. Those with more positive attitudes toward (r = 0.32, $p < 0.01$) and higher perceived behavioral control of (r = 0.40, $p < 0.01$) cessation counseling had higher intention to provide cessation counseling to tobacco users. Additionally, two items of subjective norms of cessation counseling (colleagues' expectations and feeling duty to counsel smokers) were significantly associated with intention to provide cessation counseling to tobacco users ($p < 0.01$).

Multivariable regression analysis

Overall, the final model significantly predicted intention to provide cessation counseling to tobacco users ($p < 0.01$). The final multivariable model included sociodemographic characteristics and tobacco use behaviors and perceptions (block I) and the TPB constructs (block II). We sequentially added blocks of variables and compared the nested models (Table 9). The final multivariable model, which included

blocks I and II, explained 26.5% of the variance in intention to provide cessation counseling to tobacco users ($R^2 = 0.27$, $F(5, 183) = 3.86$, $p < 0.01$).

In our final model, having bachelor's ($\beta = 2.66$, SE $= 1.20$, $p = 0.03$) or postgraduate ($\beta = 2.61$, SE $= 1.28$, $p = 0.04$) degrees compared to associate degree, and higher perceived behavioral control ($\beta = 1.22$, SE $= 0.38$, $p < 0.01$) were associated with higher intention to provide cessation counseling to tobacco users. The association of the intention to provide cessation counseling with attitudes and subjective norms was attenuated in our final model. Additional sensitivity analyses running separate models for each tobacco product showed similar results.

Discussion

This study examined how demographics, tobacco use behaviors and perceptions, and the TPB constructs (attitudes, subjective norms, and perceived behavioral control) are associated with intention of providing tobacco dependence treatment among RTs in Saudi Arabia. The overall mean intention to provide tobacco cessation counseling was moderate in our sample. The final multivariable model explained 27% of the variance in intention to provide tobacco cessation counseling. The addition of TPB constructs significantly increased the variance explained in intention to provide tobacco cessation counseling beyond demographics and tobacco use behaviors and perceptions. Our final model indicated that those with a bachelor's degree or higher and those with higher perceived behavioral control to provide tobacco cessation counseling had higher intention to provide tobacco cessation counseling. These findings add to the literature and

emphasize the importance of these factors as potential determinants and intervention targets to increase the provision of tobacco dependence treatment by RTs.

Our findings indicated that RTs with bachelor's and postgraduate degrees had higher intention to provide tobacco cessation counseling. Although the reasons for this difference are unclear, it suggests that future training programs may need to be tailored by the education level of the target population. Changes in the scope of practice for RTs with an associate degree may be needed to cover cessation counseling. This also suggests that RTs with an associate degree may require additional interventions to increase their motivation to engage in tobacco cessation counseling. Research examining the level of tobacco cessation education provided to Saudi RT students is lacking and it's unclear if RTs are exposed to tobacco cessation education within their college degree program or part of continuous medical education after employment. However, a study that examined the level of tobacco cessation education provided to students in 387 U.S. RT programs tobacco cessation education was not thoroughly covered with an average of 165 minute of instruction; and enhanced education was needed to prepare RT graduates for tobacco cessation counseling.[131] Also, the American Association for Respiratory Care (AARC) provides professional development course and certification in tobacco treatment for U.S. RTs.[132] Additionally, our findings also underscore the importance of several initiatives and strategies taken by the Saudi Ministry of Education for advancing the level of education for medical and non-medical associate, bachelor's, and master's degrees holders through grants and scholarships.[133] For instance, advancing RTs from an associate degree to a bachelor's degree may increase their exposure to tobacco cessation education. Health care educational programs, including respiratory care programs,

represent an early opportunity to instill the importance of all health care providers' role in tobacco cessation. Further research is needed to better identify the underlying reasons for differences in intention to provide cessation counseling among RTs by level of education and among RT students and interns.

Of the TPB constructs, our study emphasized the importance of perceived behavioral control as a potential determinant of tobacco cessation counseling. Higher perceived behavioral control tended to be associated with being male, having a bachelor's or post-graduate degree, being a non-tobacco user, and having positive attitudes toward and subjective norms of cessation counseling. Only a few studies have used the TPB to examine intention to provide tobacco cessation counseling; however, these studies were conducted among health care professionals or students pursuing medical-related education with varying results.[134–137] A study that was conducted among Lebanese medical students found only attitudes to significantly predict intention to provide smoking cessation counseling.[134] Another study conducted among Malaysian pharmacy students found all three TPB constructs to significantly predict intention to provide cessation counseling with an explained variance of 32.7%, which is comparable to the variance explained by our model.[135] Similarly, one study found that, among nurses, provision of tobacco cessation counseling was significantly associated with attitudes towards counseling, perceived behavioral control, and type of unit worked, with an explained variance of 36%.[136] Additionally, another study that used closely related constructs from the social cognitive theory to predict intention to provide smoking cessation counseling among Canadian physical therapists found self-efficacy and perceived professional role as significant predictors.[137] Methodological differences across

studies may account for some of the different findings. For instance, one study examined counseling behaviors[136] versus counseling intentions in our study, and the other did not specifically follow the TPB measures.[137]

Although attitudes toward and subjective norms of cessation counseling showed significant association in univariate analysis, controlling for all other factors in our final multivariable model attenuated this association. This may have been due to our low sample size, which may have underpowered our study to detect those differences. Also, the items used to define those measures in our study may have not accurately captured those constructs in this population. However, these varying results are not unusual across studies that use the TPB, which are usually seen across different target populations or different health behaviors.[96–100] Although similar constructs were used across studies, differences exist in the items used to define those constructs, which may also explain some of the differences across studies.

Despite the intention to provide tobacco cessation counseling, which is an important predictor of behavior, RTs may be underprepared to engage in tobacco cessation counseling. For instance, a lack of training is a reported challenge among RTs in the United States.[18] Our findings emphasize the importance of perceived behavioral control in leading to intention to provide tobacco cessation counseling among RTs in Saudi Arabia. This suggests that interventions should target raising perceived behavioral control through training RTs to counsel their patients, while at the same time emphasizing how counseling can be feasible, easy, and effective within their daily practice and routine. This would also help to reduce the burden of tobacco among hospitalized patients and in turn the overall population.

Strengths and limitations

Notable strengths of our study included its theory-based design. Additionally, the measures ascertained in our study were validated in the Saudi population or used among health care providers. However, the findings should be interpreted in consideration of several limitations. The temporal associations between predictors and intention to provide cessation counseling cannot be established, an inherent limitation due to the cross-sectional design of our study. Additionally, we used a convenience sample of RTs, which may limit the generalizability of our study findings to other health care providers. Larger longitudinal and more representative studies are needed to replicate our findings. Although the TPB has been used to predict many behaviors and intentions of behaviors, including determinants of tobacco cessation, it was developed and has been widely tested in predominantly White populations; therefore, it may have limited applications in other non-White populations.[138] This also suggests that the TPB may not be the most suitable theory for this population; examining other health behavior theories—especially social ecological models that examine multi-level factors—is warranted. This type of theory may provide deeper understanding of the factors associated with tobacco cessation counseling at higher institutional level (i.e., not just individual level).

Conclusion

Findings of this study can inform future intervention by identifying potential determinants of tobacco cessation counseling among RTs in Saudi Arabia, which might be targeted to promote cessation counseling. Our findings indicated that those with bachelor's or postgraduate degree and those with higher perceived behavioral control of providing tobacco cessation counseling had higher intention to provide tobacco cessation

counseling. Leveraging these factors in the development of new intervention and refinement of existing interventions targeting RTs may increase intention to provide tobacco cessation counseling, and, subsequently, the provision of actual tobacco cessation counseling. For instance, tobacco cessation training programs can be tailored to those with bachelor's degree or higher. Additional interventions to motivate those with associate degree may also be needed to engage them in tobacco cessation counseling. Moreover, college degree programs and continuous medical education courses represent an opportunity that should be leveraged to provide tobacco cessation training for RTs. Moreover, training programs should target improving perceived behavioral control of cessation counseling among RTs and emphasize how easy it is to provide cessation counseling within their current practice. This may lead to improving cessation counseling behaviors among RTs.

Tables

Table 7. Study sample characteristics (N=202)

	% (SE)
Gender	
Male	57.9 (7.0)
Female	42.1 (7.0)
Nationality	
Saudi	74.8 (6.2)
Non-Saudi	25.2 (6.2)
Marital status	
No	38.6 (6.9)
Yes	61.4 (6.9)
Education	
Associate	3.5 (2.6)
Bachelor's	77.1 (6.0)
Postgraduate	19.4 (5.6)
Income	
< 5000 SAR - 10000 SAR	30.2 (6.6)
10001 – 15000 SAR	40.0 (7.1)
15001 – 20000 SAR	18.9 (5.6)
More than 20000 SAR	11.0 (4.5)
Region	
Riyadh	57.5 (7.1)
Eastern Province	29.2 (6.5)
Other regions	13.3 (4.9)
Dual tobacco use	
No	84.7 (5.2)
Yes	15.3 (5.2)
Any tobacco use	
No	64.32 (6.9)
Yes	35.7 (6.9)
Age (Mean ± SE)	34.1 (0.6)
Waterpipe relative harm to cigarettes (range of options)	2.53 (0.1)
E-cigarette relative harm to cigarettes (range)	3.45 (0.1)
Intention to counsel tobacco users (range of options)	6.27 (0.2)

Table 8. Bivariate analyses of factors associated with intention to counsel tobacco users to quit

	Mean (SE) or r	P-value
Gender		**0.01**
Male	6.7 (0.29)	
Female	5.6 (0.33)	
Age	0.08	0.27
Nationality		0.29
Saudi	6.4 (0.25)	
Non-Saudi	5.9 (0.48)	
Marital status		0.64
No	6.1 (0.37)	
Yes	6.3 (0.29)	
Education		0.21
Associate	5.4 (1.19)	
Bachelor's	6.1 (0.26)	
Postgraduate	7.0 (0.51)	
Income		0.24
< 5000 SAR - 10000 SAR	6.0 (0.40)	
10001 – 15000 SAR	6.2 (0.38)	
15001 – 20000 SAR	6.4 (0.50)	
More than 20000 SAR	7.0 (0.66)	
Region		**0.03**
Riyadh	6.1 (0.30)	
Eastern Province	6.1 (0.40)	
Other regions	**7.5 (0.62)**	
Dual tobacco use		0.49
No	6.3 (0.25)	
Yes	5.9 (0.52)	
Any tobacco use		0.63
No	6.3 (0.29)	
Yes	6.1 (0.37)	
Waterpipe relative harm to cigarettes	-0.03	0.69
E-cigarette relative harm to cigarettes	0.10	0.17
Attitudes towards cessation counseling	0.32	**<0.01**
Subjective norms		
My colleagues expect me to counsel smokers to quit	0.25	**<0.01**
My department has a specific policy of counseling smokers to quit	0.09	0.24
I feel a duty to counsel smokers to quit	0.36	**<0.01**
Perceived behavioral control	0.40	**<0.01**

Table 9. Multivariable regression analyses of factors associated with intention to counsel tobacco users to quit

	Block I		Block I & II	
	β (SE)	*P*-value	β (SE)	*P*-value
Gender		**0.03**		0.30
Male	Ref		Ref	
Female	-1.08 (0.51)		-0.51 (0.49)	
Age	0.10 (0.05)	**0.02**	0.07 (0.04)	0.10
Nationality		**0.04**		0.07
Saudi	Ref		Ref	
Non-Saudi	-1.72 (0.83)		-1.47 (0.82)	
Marital status		0.43		0.54
No	Ref		Ref	
Yes	-0.39 (0.50)		-0.29 (0.47)	
Education				
Associate	Ref		Ref	
Bachelor's	2.31 (1.28)	0.07	2.66 (1.20)	**0.03**
Postgraduate	2.32 (1.34)	0.08	2.61 (1.28)	**0.04**
Income	-0.19 (0.28)	0.49	-0.07 (0.27)	0.79
Region				
Riyadh	Ref		Ref	
Eastern Province	-0.11 (0.56)	0.84	0.23 (0.54)	0.67
Other regions	1.00 (0.70)	0.16	0.31 (0.69)	0.65
Dual tobacco use		0.69		0.64
No	Ref		Ref	
Yes	-0.31 (0.80)		-0.36 (0.78)	
Any tobacco use		0.30		0.81
No	Ref		Ref	
Yes	-0.66 (0.63)		0.14 (0.61)	
Waterpipe relative harm to cigarettes	-0.23 (0.31)	0.45	-0.06 (0.28)	0.83
E-cigarette relative harm to cigarettes	0.24 (0.15)	0.10	0.23 (0.14)	0.10

88

	Block I		Block I & II	
	β (SE)	*P*-value	β (SE)	*P*-value
Attitudes towards cessation counseling			0.26 (0.34)	0.44
Subjective norms				
My colleagues expect me to counsel smokers to quit			0.15 (0.30)	0.61
My department has a specific policy of counseling smokers to quit			0.07 (0.21)	0.75
I feel a duty to counsel smokers to quit			0.38 (0.31)	0.22
Perceived behavioral control			1.22 (0.38)	**<0.01**

Block	F	Block df	Residual df	Pr>F	R^2	Change in R^2	Adjusted R^2	Change in adjusted R^2
I	1.90	13	188	**0.03**	0.1104		0.1081	
II	3.86	5	183	**<0.01**	0.2651	0.1547	0.2625	0.1544

Chapter 5. Evaluation of Saudi respiratory therapists' beliefs and behaviors following

completion of a pilot tobacco cessation counseling program

Introduction

Despite a decrease in tobacco use in affluent nations, smoking in Saudi Arabia is

on the rise. According to Saudi national surveys, tobacco use increased from 12.1% to

17.9% between 2013 and 2019 in both men and women, with higher rates among men

(23.7% to 27.5%) than women (1.4% to 3.7%).[5–7] This surge in smoking prevalence,

coupled with an aging population, is expected to result in a significant rise in smoking-

related illnesses such as lung cancer and chronic obstructive pulmonary disease (COPD),

which already pose a considerable health burden.[8–11] In fact, combined respiratory

diseases are now the fifth leading cause of death in Saudi Arabia, as reported by the

Saudi Ministry of Health (MoH).[8] This concerning trend underscores the pressing need

for healthcare providers to take an active role in tobacco control efforts.

One of the effective methods to combat tobacco use is through providing tobacco

dependence treatment. The Saudi guideline for tobacco calls for physicians, nurses,

dentists, dental hygienists, pharmacists, and all health care providers to deliver clear and

consistent tobacco dependence treatment, including brief cessation counseling.[139] Even

for health care providers that are busy, this can be achieved by following the Ask, Advise, Refer model, also known as the AAR model for brief counseling. Health care providers should systematically ask about tobacco use, advise tobacco users to quit, and refer those interested in quitting to appropriate treatment that includes counseling and medication. By increasing the number and diversity of healthcare providers who are trained and motivated to deliver tobacco dependence treatment, it is likely that a larger group of tobacco users will have access to evidence-based treatments.[67] This, in turn, would lead to more successful cessation rates and a subsequent reduction in the prevalence of tobacco use and related diseases.

Respiratory therapists (RTs) are a type of health care providers uniquely positioned to address tobacco dependence.[18] They have abundant opportunities to engage smokers as they mostly treat tobacco-related conditions such as COPD. They also have considerable experience interacting with patients who smoke, given that they represent the majority of their patient population.[19] However, despite the effectiveness of inpatient tobacco dependence treatment and the multiple opportunities, our initial data (Chapter 4) indicate that RTs in Saudi Arabia seem to not engage in the treatment of tobacco dependence as recommended by the Saudi Clinical Practice Guideline, which calls for systematic and multidisciplinary cessation programs.[139] The lack of national training program or certification in tobacco dependence treatment, and the limited research in formal cessation education indicate that Saudi RTs' exposure to cessation education or training is limited or inadequate. U.S. studies show that RT students only receive a mean of 165 minutes of formal education on providing tobacco cessation[131] and only about 2.7% of RTs completed a certification of tobacco treatment.[140]

Interventions targeting tobacco cessation counseling, especially theory-based interventions, among RTs in Saudi Arabia are lacking. To advance this research area, our aim was to pilot a theory-based tobacco cessation training program for RTs in Saudi Arabia. RTs typically provide specific procedures and treatments, such as breathing treatment or bronchial hygiene therapy, for patients in about 20-minute intervals.[141–143] Therefore, they are well-positioned to offer brief cessation intervention on a regular basis. They can achieve that by systematically asking about tobacco use, advising users to quit, and referring those interested in quitting to treatment that includes counseling and medication for every patient they encounter. We assessed feasibility measures related to RTs' knowledge, cognitive factors, and behaviors related to tobacco cessation counseling.

The intervention was developed around the theory of planned behavior (TPB). The TPB is a frequently used model to predict intention of health behaviors among clinicians, which is the most important determinant of behavior under volition.[88–90,129] The model consists of three primary components: (1) attitudes, which refer to the beliefs clinicians hold about tobacco dependence treatment; (2) subjective norms, which are how others perceive tobacco dependence treatment; and (3) perceived behavioral control, which is the clinician's confidence in performing tobacco dependence treatment. As predicted by the TPB, we hypothesized that the training program will increase the favorable attitudes toward, social norms of, and perceived behavioral control of intention to provide and provision of tobacco cessation counseling. In addition, we also assessed changes in knowledge and perceived barriers as outcomes in our program.

Methods

We used a pretest-posttest design for this study. All participants started with a pre-training survey to establish baseline levels of our theoretical constructs, followed by an online training program to prepare participants for brief cessation counseling, and ended with two follow-up surveys. One of the follow-up surveys was administered immediately after completion (to ascertain knowledge, beliefs, and intentions changes) and the other was administered one-month post completion (to ascertain behavioral changes in counseling). We tailored our training program to fit the Saudi context using national tobacco use and cessation data as well as data[6,7] from a previous survey on RTs' beliefs regarding tobacco dependence treatment (Chapter 4).

Participants and recruitment

We recruited RTs from several hospitals in Saudi Arabia to participate in a pilot test of our tobacco cessation training program. Our recruitment strategy was online advertisements through social media WhatsApp from November 16, 2022, to March 23, 2023. Eligibility criteria included RTs who were classified as a respiratory therapy technician, respiratory therapy specialist, respiratory therapy senior specialist, or respiratory therapy consultant specialist. This classification was self-reported and based on their highest education according to the Saudi Commission for Health Specialties classification regulations. Respiratory therapy students or interns were ineligible to participate. The study was approved by the Institutional Review Boards (IRB) of The Ohio State University (OSU) protocol number 2021H0416, and date of approval January 03, 2022.

Procedures

<u>*Course development*</u>

We developed our training program using a combination of existing resources to build a comprehensive educational training course. These resources are: 1) AARC's "Clinician's Guide to Treating Tobacco Dependence" and 2) Rx for Change®, an organization that has developed public use smoking cessation educational materials and videos for providers, including specific modules designed for RTs. Additionally, this course was tailored to the findings from our previous cross-sectional survey, emphasizing perceived behavioral control as the most important TPB construct associated with the intention to provide cessation counseling. Our training program emphasized the importance of perceived behavioral control according to our results and focused on brief tobacco cessation counseling as the most suitable form of counseling for busy health providers.

The training program (Appendix E) was delivered through an online learning management system (LMS—Canvas) to allow flexibility for the participants to self-pace their progress. Through this LMS, participants were able to communicate any questions, concerns, or clarifications. We were able to respond to participants in a timely fashion and monitor their progress. Participants progressed through a predetermined sequence of the online modules until they completed all the required modules. The training modules consisted of slides and pre-recorded videos with an estimated completion time of three hours. Our training program was accredited by the Saudi Commission for Health Specialties (SCFHS) for three Continuing Medical Education hours.

The training program consisted of five modules that covered epidemiology of tobacco use, impact of tobacco use on respiratory health, nicotine pharmacology and addiction, assisting patients with quitting, and medications for smoking cessation. The content was tailored to fit the Saudi context (e.g., epidemiology and medications available in Saudi Arabia). The modules duration ranged between 20 to 40 minutes. Attitudes and subjective norms were targeted by presenting descriptive findings (Chapter 4) that show favorable beliefs about tobacco dependence treatment. Additionally, we embedded data that explicitly and implicitly target perceived behavioral control throughout the modules. Such data included information on the effectiveness and methods of tobacco dependence treatment, how to assist patients with quitting, and the available treatments for tobacco dependence.

Pilot test procedures

The pre-training and post-training surveys were conducted online using Qualtrics, following Dillman's Tailored Design Method for internet surveys.[112] The surveys were administered in a pre-training to post-training fashion. Every participant started with the baseline survey, online training modules. Then, participants completed the first follow-up survey immediately after completing training to ascertain knowledge, beliefs, and intentions related to tobacco dependence treatment. Lastly, they completed the one-month post-training survey to ascertain tobacco cessation counseling behaviors.

Our measures were based on the Global Adult Tobacco Survey (GATS), which was developed by the U.S. Centers for Disease Control and Prevention (CDC) in collaboration with the World Health Organization (WHO) and has been used in Saudi Arabia.[7,111] The GATS questionnaire includes questions about tobacco use behaviors,

cessation behaviors, exposure to secondhand smoke, knowledge, attitudes, and perceptions about tobacco, media, and economics. We used a shortened version of the GATS questionnaire, which focuses on current use of the three most common tobacco products in Saudi Arabia (cigarettes, waterpipe, and e-cigarettes) and was modified to fit our target population of RTS (Appendix A).

An additional section of the survey explored the intention and actual provision of tobacco dependence treatment among RTs. This questionnaire was based on the TPB and has previously been used to study the behaviors of healthcare providers (Appendix B). Additionally, the survey instrument included questions about demographics and socioeconomic status. To ensure that the survey instrument was clear and accurate, the survey was translated into Arabic and then back-translated into English. The survey items were provided in both languages to participants. After modifying the survey, we piloted the instrument on three RTs from Saudi Arabia through pre-arranged videoconference meetings (Zoom) and implemented their feedback.

The researchers sent an invitation message to RT department mangers whom we are acquainted with and have their contact details at hand or their designated staff member using WhatsApp (a social media app) informing them of the study and request that they forward the survey to their eligible department staff. The RT department managers or their designated contacts subsequently sent the invites to their staff via private departmental WhatsApp group. The invitation included information about the study, the researchers, the purpose of the study, and the eligibility criteria. It also included a link to a consent form that provided information about the study, its potential risks and benefits, and the participants' rights. Those who agreed to participate were

directed to the baseline survey. We sent WhatsApp messages that contain a registration link for our online training modules to those who consented and completed the baseline survey. Reminder messages were sent every 1-2 weeks to RT department managers or their designated contact to encourage participation and recruit new participants. Additionally, we sent direct WhatsApp reminders every 1-2 weeks to all participants who 1) completed the baseline survey but did not register for the online course, 2) did not complete the first follow-up survey, or 3) did not complete the one-month post-training survey. All participants completed informed consent before starting the survey. Participants who completed the online course received three continuing medical education credits (CMEs) approved by the SCFHS. Additionally, those who completed the final survey received 40 Saudi Riyals (SAR) online gift card, which is approximately US $11.

The data collected through the online survey was stored on Qualtrics until the survey period ended. It was then exported and stored on a secure server at the OSU College of Public Health (CPH). Access to the data was restricted to approved study researchers.

Measures

Outcome measures

Intention to provide tobacco cessation counseling. We defined intention to provide tobacco cessation counseling using the average of three items. The participants were asked "On a scale of 0 to 10, with 0 being "never" and 10 being "always," how often do you intend to provide smoking cessation advice in your clinical rounds to patients who smoke [cigarettes/waterpipe/e-cigarettes]?" Response options for all three

items ranged from 0 to 10. This outcome was ascertained at baseline and immediately after training completion.

Tobacco cessation counseling behaviors. We asked participants about their brief counseling behaviors (ask, advise, refer [AAR]) including asking patients about their smoking status, advising patients to stop smoking, and referring patients to appropriate cessation treatment. Response options were on a scale from 1 (Never) to 5 (Always). This outcome was ascertained at baseline and one-month post training completion.

<u>*Covariates and feasibility measures*</u>

TPB Constructs. We defined attitudes toward tobacco cessation counseling using the average of four items. The participants were asked "To what extent do you agree or disagree with the following statements about helping your patients quit smoking: 1) I enjoy counseling patients about smoking cessation, 2) I think counseling patients about smoking cessation is important, 3) Counseling patients about smoking cessation can strengthen the RT-patient relationship, and 4) I find that counseling patients about smoking cessation is personally rewarding." Similarly, we defined perceived behavioral control using the average of four items. The participants were asked to what extent they agree or disagree with the following statements: "1) I am able to help smokers who want to quit even if they think it will be difficult to quit, 2) I feel comfortable asking my patients about their smoking behaviors, 3) I know how to recommend medication for tobacco cessation (e.g., nicotine replacement/ bupropion/ varenicline), and 4) I believe I can provide counselling even when time is limited." Additionally, we used three items to capture subjective norms, in which the participants were asked to what extent the agree or disagree with: "1) My colleagues expect me to counsel smokers to quit, 2) My

department has a specific policy of counseling smokers to quit, and 3) I feel a duty to counsel smokers to quit." Similarly, we used the average of these three items. Response options to all the TPB items included a 5-point Likert-type scale ranging from "Strongly disagree" to "Strongly agree." All the TPB constructs were measured at baseline and immediately post-training.

Knowledge of tobacco use and cessation. We created ten questions about tobacco use and cessation, and tobacco cessation counseling in Saudi Arabia, which are covered in the training program. We defined knowledge of tobacco use and cessation using the sum score of the ten questions with 1 point assigned to the correct answer option and 0 to any of the other incorrect answer options for each question. For instance, the participants were asked: In patients with asthma, smoking reduces which of the following? The response to treatment with inhaled and systemic corticosteroids (1 point), The risk of asthma exacerbations in adults (0 point), The likelihood of developing asthma in infants/children (0 point), The likelihood of severe asthma in infants/children (0 point), or I don't know (0 point) The knowledge items were measured at baseline and immediately post training.

Perceived barriers. We defined perceived barriers as the average rating of five statements on a scale of 1 (Not a barrier) to 3 (A significant barrier). These statements included 1) Too few cessation programs are available, 2) Patients have more immediate problems to address, 3) I am unfamiliar with interventions to help smokers quit, 4) Patients are not motivated to quit, and 5) Patients usually fail to quit. We measured these items at baseline and immediately after training completion.

Current tobacco use behaviors. We defined current use (daily or less than daily) of cigarettes, waterpipe, and e-cigarettes using "Do you currently use any of the following tobacco products on daily or less than daily basis _____? Response options included "Cigarettes," "Waterpipe with tobacco," "Electronic cigarettes," "Not at all," "Don't know," or "Prefer not to answer." Tobacco use behaviors were measured at baseline and one-month post training completion.

Demographics. We assessed sociodemographic factors, including age, sex, marital status, nationality, education level, and household income. We assessed demographics at baseline only.

Satisfaction and follow-up. We queried participants about their satisfaction level with the training program using several close- and open-ended questions. Open-ended questions included: "Please describe what you liked about the training program," "Please describe what you did not like about the training program," and "Please describe the barriers you face to providing brief counseling to smokers." Additionally, we asked participants: "Overall, how satisfied were you with the training program on a scale of 1 (Very satisfied) to 7 (Very dissatisfied)." We also asked if they would recommend this training program to their patients or other health providers, and if they had any recommendations to improve the training program. Satisfaction and follow-up measures were assessed immediately post training completion.

Analysis

Given the pilot nature of our study, we only used descriptive statistics (Mean and standard deviation (SD)) to describe changes in our study measures (intentions, knowledge, beliefs, and behaviors) from pre- to post-training. Those descriptive statistics

serve as feasibility measures for our study. We conducted no statistical testing or modeling. All analyses were conducted using SAS 9.4 (SAS Institute Inc., Cary, NC).

Results

Sample characteristics

The total number of participants who signed up for the training program was 27. Of those, 8 completed the training program and the immediate post training survey. However, only 6 participants completed the second follow-up survey one month after training completion. Most of the participants who completed the training program were male (62.5%), Saudi (87.5%), married (75%), bachelor's degree holder (75%), with household income of SAR 5,000 or more (62.5%).

Changes in cognitive factors (baseline – immediately post-training)

The mean intention to provide tobacco cessation counseling increased from 7.5 (SD 3.1) at baseline to 8.5 (SD 2.0) immediately post-training completion. Similarly, the TPB constructs increased post training completion. Attitudes toward [4.1 (SD 0.5) – 4.4 (SD 0.4)], subjective norms of [3.1 (SD 0.6) – 3.4 (SD 0.9)], and perceived behavioral control of [3.1 (SD 0.7) – 3.7 (SD 0.5)] tobacco cessation counseling increased post training completion. Additionally, knowledge of tobacco cessation counseling increased from 2.8 (SD 1.9) at baseline to 4.6 (SD 1.1) immediately post training completion. The mean perceived barriers of tobacco cessation counseling decreased from 2.1 (SD 0.3) to 1.8 (SD 0.5) post training (Table 10).

Changes in tobacco use and counseling behaviors (baseline – 1-month post training)

101

There was no change in current tobacco use status in our sample. However, one participant reported a quit attempt for one day or more in the past month since completing the training program. RTs reported an increase in the frequency of brief counseling behaviors. Asking patients about their smoking status increased by 23% from an average score of 3.1 (SD 1.2) to 3.8 (SD 1.3) one month post training (Scale 1-5). Similarly, advising patients to stop smoking increased by 36% from an average score of 2.8 (SD 1.3) to 3.8 (SD 1.2) after training completion (Scale 1-5). Additionally, referring patients to appropriate cessation treatment increased by 16% from an average score of 1.9 (SD 1.2) to 2.2 (SD 1.0) (Scale 1-5) (Table 11).

Satisfaction and follow-up

All participants were somewhat to very satisfied with the training program. They noted that the program was organized, comprehensive, easy to access, informative, and easy to understand for all health care practitioners. However, they thought the program and some of its presentations were lengthy and suggested breaking down some of the presentations to make them shorter. They described patients' unwillingness or lack of interest as the main barrier to providing brief counseling to smokers. All participants reported that they would recommend the training program to other health care providers. However, some of them noted that the training program may be too intense (in terms of information) to recommend it for patients.

Discussion

This study sought to examine changes in beliefs, intentions, and behaviors related to brief cessation counseling following completion of a pilot training program in tobacco

102

cessation counseling. The key findings of our study indicated that those who completed the online training program reported higher favorable attitudes toward, subjective norms of, perceived behavioral control of, and intentions to providing tobacco cessation counseling. Additionally, they reported lower perceived barriers and higher knowledge of tobacco dependence treatment following completion of the training program. Similarly, the participants reported higher frequency of delivering brief cessation counseling behaviors one-month after the intervention, including asking about smoking status, advising patients who smoke to quit, and referring patients to appropriate tobacco dependence treatment. These positive findings could suggest that RTs in Saudi Arabia may be in a good position to provide effective brief cessation counseling following this training program if the results hold in a larger sample.

In addition to tailoring the training materials to include tobacco use and cessation data about Saudi Arabia, our training program was tailored using survey data from RTs in Saudi Arabia. Our survey among Saudi RTs indicated that perceived behavioral control is potentially an important determinant to tobacco cessation counseling. The training program was focused on brief cessation counseling (AAR model) with specific emphasis on targeting feelings related to perceived behavioral control (self-efficacy) of providing tobacco cessation counseling. Our training program emphasized how easy and effective brief cessation counseling is and how it can be delivered within the RT's daily routine and practice. This may explain the relatively higher change in perceived behavioral control than the other TPB constructs. Also, this finding is in line with extant literature on training health care providers (e.g., pharmacists, dentists, RTs), which demonstrated an increase in self-efficacy of provision of brief tobacco cessation counseling, and higher

referral rates.[18,144,145] The positive changes in the other TPB constructs (i.e., attitudes and subjective norms) may have also been affected by the training program directly (some of training materials presented Saudi RTs beliefs from our survey) or indirectly by our emphasis on perceived behavioral control. These changes may have collectively contributed to the higher reported intentions to providing cessation counseling and provision of brief cessation counseling behaviors one month after the intervention.

The overall increase in TPB constructs and intentions, increase in knowledge of tobacco cessation counseling, reduction of perceived barriers, and increase in brief counseling behaviors suggest that our intervention is feasible for broad implementation among RTs in Saudi Arabia. These findings also indicate that Saudi RTs would be in a better position to provide an impactful and effective brief cessation counseling that would likely contribute to an increase in tobacco cessation rates among their patients. Although increasing knowledge, beliefs, and intentions is an important first step to improve cessation counseling among RTs in Saudi Arabia, it may not be sufficient to maintain systematic changes in behaviors. This would require a genuine integration of tobacco cessation within the health care system infrastructure and departmental policies and procedures. Furthermore, it would need consistent continuous development programs and further training for RTs.

Our intervention was based on a theory commonly used to predict intentions and health behaviors among health providers. Our intervention was developed specifically to fit RTs in Saudi Arabia targeting changes in specific beliefs. The TPB does not provide specific timeline for behavioral changes; thus, our study design was pretest-posttest with a 1-month follow-up to ascertain behavioral changes. However, these findings should be

interpreted considering several limitations. Due to the pilot nature of the study and small number of participants who completed pre-training and post-training surveys, we did not conduct statistical testing or modeling to determine an effect measure of the training program. However, nearly all participants were very satisfied with the training program. Those who completed the training program completed all the pre-training and post-training surveys, indicating no excessive burden on the participants. However, only a small number of participants completed the program. Although we do not have specific data that explain this low completion rate, reasons may be related to the platform we used (participants had to complete a few steps to access the training program), or RT's workload (as conveyed by some participants who responded to reminders). This indicates that the program delivery method may need to be tailored to the specific needs of the target population, which was not part of this study.

Future studies should be implemented on a larger scale to ascertain the effectiveness of the training. They should also explore whether a change in the method of delivery (from online to in-person) would impact the interest, recruitment, and effectiveness of the training program. However, this should be balanced to achieve optimum scalability of the training program. Additionally, the next iteration of the training program should take the participants' suggestions in consideration. The training program should be further refined to provide shorter modules with less intense but targeted information on the pertinent knowledge and skills needed in RTs' daily routine and practice. Additional training in workshop format to expose RTs with common scenarios may be needed to reinforce the new skills and knowledge with practice.

Tables

Table 10. Changes in RTs' intentions, beliefs, and knowledge at baseline (N=8) and immediately post training (N=8)

	Pre-training Mean (SD)	Post-training Mean (SD	% Change in Mean
Intention to providing tobacco cessation counseling	7.5 (3.1)	8.5 (2.0)	13
Attitudes towards tobacco cessation counseling	4.1 (0.5)	4.4 (0.4)	7
Subjective norms of tobacco cessation counseling	3.1 (0.6)	3.4 (0.9)	10
Perceived behavioral control of tobacco cessation counseling	3.1 (0.7)	3.7 (0.5)	19
Knowledge of tobacco cessation counseling	2.7 (1.9)	4.6 (1.1)	70
Perceived barriers of tobacco cessation counseling	2.1 (0.3)	1.8 (0.5)	14

Table 11. Changes in brief counseling behaviors at baseline (N=8) and 1-month post training (N=6)

	Pre-training Mean (SD)	Post-training Mean (SD	% Change in Mean
Asking patients about their smoking status	3.1 (1.2)	3.8 (1.3)	23
Advising patients to stop smoking	2.8 (1.3)	3.8 (1.2)	36
Referring patients to appropriate cessation treatment	1.9 (1.6)	2.2 (1.0)	16

Chapter 6. Discussion

This project provided an insight into the beliefs and behaviors related to tobacco use and cessation among RTs in Saudi Arabia. In the long term, this research aims to reduce the tobacco burden and increase tobacco cessation counseling behaviors among RTs in Saudi Arabia. Ultimately, it aims to reduce the tobacco burden (i.e., tobacco use and tobacco-related diseases) in the Saudi population. This research was built on the existing literature on tobacco use and cessation counseling among healthcare providers by recognizing that Saudi RTs are in unique position to take an active role in tobacco control efforts and address tobacco dependence. Thus, we based this research on the rigorous underpinnings of health behavior theory (i.e., the TPB) to advance our understanding of the factors associated with tobacco use and provision of tobacco cessation counseling and build the foundation for a scalable training program for RTs in Saudi Arabia.[88–90,129] This study was grounded in the TPB that examined attitudes, subjective norms, and perceived behavioral control as important factors related to current practices and future intentions to help tobacco users quit.

In Component I of the study (Aims 1 and 2), we collected cross-sectional data to evaluate tobacco use and tobacco dependence treatment among RTs in Saudi Arabia. In the Aim 1 study, we assessed the prevalence of the most commonly used tobacco products in Saudi Arabia (cigarettes, waterpipe, and e-cigarettes) among RTs and identified predictors of each tobacco product. Since most of the existing literature focuses

107

on young adults and waterpipe or e-cigarette,[30,54,57,123–125] or physicians and cigarette smoking,[23,55] the study added novel findings on the prevalence and predictors of the most common tobacco products, including e-cigarettes, among RTs who specialize in management and treatment of respiratory and tobacco-related diseases. Building on findings of the Aim 1 study and informed by the literature, in Aim 2 we assessed the factors associated with the intention to provide tobacco cessation counseling among RTs in Saudi Arabia. This study furthered our understanding by adding novel findings on potential determinants of provision of tobacco cessation counseling among RTs. In component II of the study (Aim 3), we implemented the TPB and used it as a behavioral change theory by leveraging the findings of Component I to tailor a training program for RTs. In the Aim 3 Study, we piloted the training program to assess feasibility measures related to RTs' knowledge, beliefs, and behaviors related to tobacco cessation counseling in a pretest-posttest fashion. This study characterized early evidence of the potential impact and scalability of our training program on RTs' tobacco counseling behaviors. The findings represent an important first step to improve cessation counseling among RTs in Saudi Arabia.

Across our aims, the study has advanced our understanding of the factors associated with tobacco use and cessation counseling behaviors among RTs in Saudi Arabia. In the Aim 1 study, we shed light on the prevalence and predictors of tobacco use among RTs in Saudi Arabia. In our sample of RTs working in Saudi Arabia, current tobacco use was prevalent, with estimates highest for e-cigarette use, followed by waterpipe smoking, and cigarette smoking. Interestingly, the patterns of tobacco use varied by gender. Female RTs reported waterpipe as their most common tobacco product,

followed by e-cigarettes and cigarettes. However, male RTs were more likely to use e-cigarettes as their primary product, followed by cigarettes and waterpipe. Furthermore, the study found that individuals who perceived a higher risk associated with e-cigarette use or waterpipe smoking compared to cigarettes were less likely to be current users of those products.

In the Aim 2 study, we found that RTs in our sample had moderate intentions to provide tobacco cessation counseling to their patients. Additionally, the findings of our study revealed that RTs with a bachelor's degree or higher, and those who had a greater perceived behavioral control (i.e., greater sense of control over their ability) to provide tobacco cessation counseling, demonstrated higher intentions toward offering such counseling.

In the Aim 3 study, we determined that participants who completed the online training program showed more positive attitudes toward, greater subjective norms of, and increased perceived behavioral control of providing tobacco cessation counseling. They also expressed a greater intention to provide such counseling, as well as lower perceived barriers and an increased understanding of tobacco dependence treatment after finishing the training. Additionally, one-month after the training, participants reported a higher frequency of engaging in brief cessation counseling behaviors such as asking about smoking status, advising patients to quit smoking, and referring patients to suitable tobacco dependence treatment.

Implications and Future Directions

This research project has several practice, policy, and education implications in line with the national 2030 Vision,[1] aiming to reduce tobacco burden and improve tobacco cessation counseling behaviors among RTs in Saudi Arabia. Examples include tailoring interventions, such as risk messages, specifically to men and women to elicit higher risk perception of tobacco use; targeting raising perceived behavioral control through training RTs to counsel their patients; and providing a training program for RTs is needed. Our findings from Aim 1 suggests that tobacco control interventions aimed at reducing cigarette and e-cigarette use should be tailored based on the gender of the target population. However, our study did not investigate the precise factors that impact tobacco use in men and women. Although recent studies[127] imply that social factors may prompt Saudi women to initiate smoking, more research is necessary to explore these differences, particularly among female healthcare providers who may encounter distinct obstacles compared to the general population. Addressing gender differences in tobacco use may minimize the tobacco burden among the RT population. Apart from gender, our study emphasizes that relative risk perceptions of e-cigarettes and waterpipe compared to traditional cigarettes play a crucial role in e-cigarette and waterpipe use. Therefore, our study suggests that risk perceptions can be effective targets for interventions among RTs in Saudi Arabia. Further research is required to investigate whether modifying risk perceptions would lead to a decrease in waterpipe and e-cigarette use among RTs.

Aim 2 findings indicate that training programs designed for RTs should be tailored by their education level and additional interventions may be necessary for those

110

with associate degree to raise their motivation to engage in tobacco cessation counseling. Our study also supports the numerous initiatives and approaches taken by the Saudi Ministry of Education to improve the educational level of individuals holding associate, bachelor's, and master's degrees in medical and non-medical fields, via grants and scholarships.[133] Health care educational programs, including respiratory care programs, present an early opportunity to instill the significance of all healthcare providers' role in tobacco cessation. Future research should examine the level of RTs' exposure to tobacco cessation education within their formal education programs or continuous development after employment. Additionally, further research is necessary to explore differences in cessation counseling intentions among RTs based on their education level and among RT students and interns. Moreover, findings from Aim 2 underscore the significance of perceived behavioral control in fostering the intention to offer tobacco cessation counseling among RTs in Saudi Arabia. This indicates that interventions should concentrate on enhancing perceived behavioral control by training RTs to counsel their patients and highlighting the feasibility, ease, and effectiveness of counseling in their everyday practice and routine. This approach would also aid in reducing the tobacco burden among hospitalized patients and, ultimately, the overall population.

Our Aim 3 findings provide one of the earliest evaluations of Saudi RTs' beliefs, knowledge, and behaviors following completion of pilot training in tobacco cessation. The encouraging results suggest that our intervention is feasible for wider implementation among RTs in Saudi Arabia. The results also indicate that Saudi RTs could deliver influential and efficient brief counseling for smoking cessation, which could potentially enhance tobacco cessation rates among their patients. However, merely

111

increasing knowledge, beliefs, and intentions may not be enough to bring about enduring

changes in behavior. To achieve this, it would be necessary to integrate tobacco cessation

into the infrastructure of the healthcare system and departmental policies and procedures.

Additionally, there should be ongoing professional development programs and further

training opportunities for RTs to ensure consistency. It may be beneficial to improve the

training program by developing shorter modules that provide focused information on the

essential knowledge and skills required in RTs' daily work. These modules should be less

intense but more targeted. Furthermore, it may be necessary to conduct additional

workshops to provide RTs with hands-on training and practice with common scenarios to

reinforce their new knowledge and skills. To ensure the training's effectiveness, it would

be beneficial to conduct future studies on a larger scale to determine actual cessation

counseling measures and patients' outcomes. This would enable a more comprehensive

evaluation of the training's impact and provide a more reliable indication of its success.

Additional interventions should explore the impact of establishing policies and

procedures for tobacco cessation counseling among Saudi RT departments.

Limitations

When interpreting the results of our research project, it is crucial to consider its

limitations. Our research was largely based on the TPB, which has been utilized to

predict various behaviors and intentions, including factors that lead to tobacco cessation.

However, it was created and has been primarily tested in populations of predominantly

White Western individuals. Consequently, its applicability in non-White populations may

be limited.[138] Although our findings suggest that the TPB is a valid model to predict

tobacco cessation counseling in our population, it might not be the best theory for this particular population, and it may be necessary to explore other health behavior theories. Social ecological models, for instance, which consider multiple levels of factors, could provide a more in-depth examination of the determinants linked to tobacco cessation counseling beyond the individual level, specifically at higher institutional levels. Furthermore, due to the lack of a specific timeline for behavioral change provided by the TPB, the follow-up timeline for Aim 3 was chosen arbitrarily and limited by the time constraints of our project. Component I (Aims 1 and 2) of our research was cross-sectional, so we cannot establish a temporal relationship between the predictors and tobacco use and intentions to provide cessation counseling. We did not achieve our desired sample size, which limited our ability to use interaction terms for the imputation models and in our analytical models. Moreover, we used a convenience sample of RTs, which may limit the generalizability of our study's findings to the RT population in Saudi Arabia. However, our sample's demographic distribution was similar to that of the RT population in Saudi Arabia.[126] Our Aim 3 study was a pilot assessment and only a limited number of participants completed both the pre-training and post-training surveys; therefore, we did not perform statistical testing or modeling to determine the impact of the training program. Across Aims 1-3, our studies' outcomes were self-reported and were not verified using other objective measures like cotinine measurement (tobacco use) or medical record entries (counseling behaviors), which may have impacted our estimates.

Conclusion

In conclusion, our research explored prevalence and correlates of tobacco use, predictors of intentions to provide cessation counseling, and a pilot training program in tobacco cessation counseling among key health care professionals—RTs who regularly interact with patients suffering from tobacco-related illnesses. We found that the most important predictors of tobacco use were gender and relative risk perceptions, highlighting the role of these factors as targets in interventions designed to reduce the burden of current tobacco use in this population. We also identified potential determinants of tobacco cessation counseling among RTs in Saudi Arabia, including the level of education and perceived behavioral control (i.e., confidence in providing cessation counseling, emphasizing the role of these factors in to promoting cessation counseling. Additionally, our pilot training program, which was tailored to our specific study, was able to enhance beliefs related to the TPB constructs and intentions, boost knowledge of tobacco cessation counseling, lower perceived barriers, and increase the frequency of brief counseling behaviors. These findings indicate that our intervention is feasible for use among a wider range of RTs in Saudi Arabia. These positive outcomes also suggest that Saudi RTs would be better equipped to provide effective brief cessation counseling, thereby potentially leading to an increase in tobacco cessation rates among their patients. Overall, he outcomes of our research can be used as a valuable resource for creating interventions, policies, and educational programs to promote a healthy environment, reduce the risk of tobacco-related illness among health care providers, and improve the overall health of the population.

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Tobacco use and provision of tobacco dependence treatment among respiratory therapists in Saudi Arab

Thank you for taking the survey. This survey asks about your role in tobacco use and tobacco cessation. This important information will help researchers and policy makers understand the potential role of respiratory therapists in combatting tobacco use. The survey is composed of several sections and will take about 20 minutes to complete. All responses will be confidential and study results will only be reported in aggregate form/شكرًا لك على المشاركة في الاستبيان. يطرح هذا الاستبيان أسئلة عن دورك في استخدام التبغ والإقلاع عنه. ستساعد هذه المعلومات المهمة الباحثين وصناع القرار على فهم الدور المحتمل لأخصائيي العلاج التنفسي في مكافحة استخدام التبغ. يتكون الاستبيان من عدة أقسام ويستغرق إكماله حوالي 20 دقيقة. ستكون جميع الردود سرية ولن يتم الإفادة عن نتائج الدراسة إلا في شكل إجمالي.

This section profiles your background and current medical practice and training/يتمحور هذا القسم حول خلفيتك والممارسة الطبية الحالية والتدريب

What is your gender/ما جنسك؟
    Male/)1(ذكر
    Female/)2(أنثى
    Prefer not to answer/)3(أفضل عدم الإجابة

What is your nationality/ما جنسيتك؟
    Saudi/)1(سعودي
    Other/)2:(أخرى _____

129

How old are you/كم عمرك؟

_____

What is your marital status/ما حالتك الاجتماعية؟
    Married/)1(متزوج
    Single/)2(أعزب
    Divorced/)3(مطلّق
    Widowed/)4(أرمل
    Prefer not to answer/)5(أفضل عدم الإجابة

What is the highest level of education you have completed/ما أعلى مستوى تعليمي حصلت عليه؟
    Diploma/)1(دبلوم
    Bachelor's degree/)2(بكالوريوس
    Master's degree/)3(ماجستير
    Doctoral degree/)4(دكتوراة
    Other/)5: (أخرى_____
    Prefer not to answer/)6(أفضل عدم الإجابة

Which of the following best describes your main work status over the past 12 months/ أي
مما يلي يصف بشكل أفضل حالة عملك الرئيس على مدار الـ 12 شهرًا الماضية؟
    Government hospital/)1(مستشفى حكومي
    Non-government hospital/)2(مستشفى غير حكومي
    Education/)3(تعليم
    Respiratory therapy student/)6(طالب علاج تنفسي
    Respiratory therapy intern/)7(طالب امتياز في العلاج التنفسي
    Other/)4: (أخرى_____
    Prefer not to answer/)5(أفضل عدم الإجابة

Which monthly income group does your household fall under/ما فئة الدخل الشهري التي يندرج
تحتها دخل أسرتك؟
    Less than 5000 SAR/)1(أقل من 5000 ر.س
    5000 – 10000 SAR (2)
    10001 – 15000 SAR (3)
    15001 – 20000 SAR (4)
    More than 20000 SAR/)5(أكثر من 20000 ر.س
    Prefer not to answer/)6(أفضل عدم الإجابة

In which region of Saudi Arabia do you work / في أي منطقة من المملكة العربية السعودية تعمل؟

▼ Riyadh/)1(الرياض ... Prefer not to answer/)14(أفضل عدم الإجابة

In a typical week, how many hours do you provide of direct patient care / في الأسبوع العادي
كم عدد الساعات التي تقدم فيها رعاية مباشرة للمرضى، ؟
    None/)1(لا شيء
    1-10 (2)
    11-20 (3)
    21-30 (4)
    31-40 (5)
    41+ (6)
    Prefer not to answer/)7(أفضل عدم الإجابة

To what type of patients do you provide care/ما نوع المرضى الذين تقدم لهم الرعاية؟ [check all that apply /حدد كل ما ينطبق]

☐   Adult/)1(الكبار

☐   Pediatric/)2(الأطفال

☐   Neonatal/)3(حديثي الولادة

☐   Long-term/)4(طويلة الأمد

☐   Other/)5: أخرى

_____

☐   Prefer not to answer/)6(أفضل عدم الإجابة

What areas of the hospital do you cover/ما مناطق المستشفى التي تغطيها؟ [check all that apply/
حدد كل ما ينطبق]

☐   وحدات العناية المركزة)1(/Intensive care units

☐   أجنحة)2(/Wards

☐   وحدات الرعاية طويلة الأمد)3(/Long-term care units

☐   قسم الطوارئ)4(/Emergency department

☐   مختبر وظائف الرئة)5(/Pulmonary function lab

☐   مختبر دراسات النوم)6(/Sleep lab

☐   الرعاية المنزلية)7(/Home care

☐   أخرى)8(/Other
     _____

☐   أفضل عدم الإجابة)9(/Prefer not to answer

في أي عام بدأت العمل كأخصائي علاج تنفسي؟/In what year did you start working as an RT
_____

What is your current job title within your institution/ما مسماك الوظيفي الحالي داخل مؤسستك؟
     أخصائي)1(/Staff therapist
     أخصائي أول)2(/Senior therapist
     مشرف)3(/Supervisor
     مثقف صحي)4(/Health Educator
     آخر)5(:Other/_____
     أفضل عدم الإجابة)6(/Prefer not to answer

The Next sections ask about tobacco products use. There are specific questions for cigarettes, waterpipe, and electronic cigarettes/الأقسام القادمة تقدم أسئلة عن استخدام منتجات التبغ. يوجد أسئلة محددة لكلٍ من السجائر، النرجيلة (الشيشة أو المعسل)، والسجائر الإلكترونية.

نود أولاً أن نطرح /We would first like to ask you some questions about **smoking cigarettes** عليك بعض الأسئلة حول **تدخين السجائر**.

Have you ever, **even once**, smoked cigarettes/تدخين السجائر، **ولو مرة واحدة**، هل سبق لك؟
   Yes/)1(نعم
   No/)2(لا
   Don't know/)3(لا أعرف
   Prefer not to answer/)4(أفضل عدم الإجابة

في الماضي، هل دخنت السجائر بشكل_____In the past, have you smoked cigarettes؟
   Daily/)1(يومي
   Less than daily but regularly/)2(أقل من يومي و لكن بشكل منتظم
   Not at all/)3(لا أدخن على الإطلاق
   Don't know/)4(لا أعرف
   Prefer not to answer/)5(أفضل عدم الإجابة

Do you **currently** smoke cigarettes_____هل تقوم **حالياً** بتدخين السجائر بشكل؟
   Daily/)1(يومي
   Less than daily but regularly/)2(أقل من يومي و لكن بشكل منتظم
   Not at all/)3(لا أدخن على الإطلاق
   Don't know/)4(لا أعرف
   Prefer not to answer/)5(أفضل عدم الإجابة

On average, how many **cigarettes** do you currently smoke **each day** (remember, 1 pack is 20 cigarettes)/في المتوسط، كم عدد **السجائر**التي تدخنها حالياً **كل يوم** (علماً بأن علبة السجائر تحتوي على/20 سيجارة)؟
   _____

On average, how many **cigarettes** do you currently smoke **each week** (remember, 1 pack is 20 cigarettes)/في المتوسط، كم عدد **السجائر**التي تدخنها حالياً **كل أسبوع**)علماً بأن علبة السجائر تحتوي على 20 سيجارة(؟

_____

How soon after you wake up do you usually have your first cigarette/متى تقوم بتدخين أول سيجارة عادة بعد استيقاظك من النوم؟

في غضون 5 دقائق   )1(/Within 5 minutes
في غضون 6 إلى 30 دقيقة   )2(/6 to 30 minutes
في غضون 31 إلى 60 دقيقة   )3(/31 to 60 minutes
أكثر من 60 دقيقة   )4(/More than 60 minutes
أفضل عدم الإجابة)5(/Prefer not to answer

Which of the following best describes your thinking about quitting cigarette smoking/أي مما يلي يصف تفكيرك بشكل أفضل في الإقلاع عن تدخين السجائر؟

أخطط للإقلاع عن تدخين السجائر خلال الشهر المقبل)1(/ I am planning to quit within the next month
أفكر في الإقلاع عن تدخين السجائر خلال الـ 12 شهرًا القادمة)2(/ I am thinking about quitting within the next 12 months
سأقلع عن تدخين السجائر يومًا ما و لكن ليس خلال ال 12 شهرًا القادمة)3(/I will quit someday but not within the next 12 months
أنا لست مهتمًا بالإقلاع عن تدخين السجائر   )4(/ I am not interested in quitting
لا أعرف)5(/Don't know
أفضل عدم الإجابة)6(/Prefer not to answer

During the past 12 months, have you tried to stop smoking cigarettes/خلال ال 12 شهرًا الماضية، هل حاولت الإقلاع عن تدخين السجائر؟

نعم)1(/Yes
لا)2(/No
أفضل عدم الإجابة)3(/Prefer not to answer

Thinking about the last time you tried to quit, how long did you stop/عند التفكير في آخر مرة حاولت فيها الإقلاع عن تدخين السجائر، كم هي المدة التي توقفت فيها؟

(Pick a unit from the options below then enter the number in the following question/اختر

(وحدة من الخيارات أدناه ثم أدخل العدد في السؤال التالي

    شهور (1/Months)
    أسابيع (2/Weeks)
    أيام (3/Days)
    أقل من يوم (4/Less than 1 day)
    لا أعرف (5/Don't know)

أدخل عدد الشهور منذ أن توقفت/Enter number of months since you stopped cigarette smoking
عن تدخين السجائر:

   _____

أدخل عدد الأسابيع منذ أن توقفت/Enter number of weeks since you stopped cigarette smoking
عن تدخين السجائر:

   _____

أدخل عدد الأيام منذ أن توقفت عن/Enter number of days since you stopped cigarette smoking
تدخين السجائر:

   _____

كم مضى منذ أن توقفت عن تدخين/How long has it been since you stopped cigarette smoking
السجائر؟

اختر /Pick a unit from the options below then enter the number in the following question)
(وحدة من الخيارات أدناه ثم أدخل العدد في السؤال التالي
    سنوات (1/Years)
    شهور (2/Months)
    أسابيع (3/Weeks)
    أيام (4/Days)
    أقل من يوم (5/Less than 1 day)
    لا أعرف (6/Don't know)
    أفضل عدم الإجابة (7/Prefer not to answer)

Enter number of years since you stopped cigarette smoking/أدخل عدد السنوات منذ أن توقفت عن تدخين السجائر:

_____

Enter number of months since you stopped cigarette smoking/أدخل عدد الشهور منذ أن توقفت عن تدخين السجائر:

_____

Enter number of weeks since you stopped cigarette smoking/أدخل عدد الأسابيع منذ أن توقفت عن تدخين السجائر:

_____

Enter number of days since you stopped cigarette smoking/أدخل عدد الأيام منذ أن توقفت عن تدخين السجائر:

_____

End of Block: Cigarette

Start of Block: Waterpipe (Shisha/Nargile)

This section asks about **smoking waterpipe with tobacco**. Waterpipe is also known as shisha or mua'ssal/يطرح هذا القسم أسئلة عن **تدخين النرجيلة (**الشيشة أو المعسل **(مع التبغ**.

Have you ever, **even once**, smoked waterpipe with tobacco/هل سبق لك، **ولو مرة واحدة**، تدخين (مع التبغ) الشيشة أو المعسل(النرجيلة)؟

نعم (Yes/)1
لا (No/)2
لا أعرف (Don't know/)3
أفضل عدم الإجابة (Prefer not to answer/)4

136

In the past, have you smoked a waterpipe with tobacco _____ /هل دخنت، **في الماضي**،)النرجيلة)الشيشة أو المعسل)مع التبغ بشكل؟

يومي (1(/Daily

أقل من يومي و لكن بشكل منتظم (2(/Less than daily but regularly

لا أدخن على الإطلاق (3(/Not at all

لا أعرف (4(/Don't know

أفضل عدم الإجابة (5(/Prefer not to answer

Do you **currently** smoke waterpipe with tobacco_____الشيشة)النرجيلة بتدخين **حالياً** هل تقوم ؟أو المعسل)مع التبغ بشكل

يومي (1(/Daily

أقل من يومي و لكن بشكل منتظم (2(/Less than daily but regularly

لا أدخن على الإطلاق (3(/Not at all

لا أعرف (4(/Don't know

أفضل عدم الإجابة (5(/Prefer not to answer

On average, how many **sessions of waterpipe with tobacco** do you currently smoke **each day/ كل يوم** التي تدخنها حالياً **)مع التبغ** في المتوسط، كم عدد **جلسات النرجيلة)الشيشة أو المعسل**؟

_____

On average, how many **sessions of waterpipe with tobacco** do you currently smoke **each week/ كل أسبوع** التي تدخنها حالياً **)مع التبغ** في المتوسط، كم عدد **جلسات النرجيلة)الشيشة أو المعسل**؟

How soon after you finish smoking waterpipe with tobacco do you usually start to feel a strong desire, which is hard to ignore, to use waterpipe with tobacco or any other form of tobacco/ بعد الانتهاء من تدخين النرجيلة)الشيشة أو المعسل)مع التبغ، متى تبدأ عادة في الشعور برغبة قوية ، والتي يصعب تجاهلها لاستخدام النرجيلة)الشيشة أو المعسل)مع التبغ أو أي شكل آخر من أشكال التبغ؟

في غضون 60 دقيقة (1(/Within 60 minutes

بعد 1 إلى 3 ساعات (2(/after 1 to 3 hours

أكثر من 3 ساعات و لكن أقل من يوم كامل (3(/More than 3 hours but less than one full day

يوم أو أكثر (4(/1 day or more

أبداً (5(/Never

لا أعرف (6(/Don't know

أفضل عدم الإجابة (7(/Prefer not to answer

Which of the following best describes your thinking about quitting smoking waterpipe أي مما يلي يصف بشكل أفضل تفكيرك في الإقلاع عن تدخين النرجيلة (الشيشة أو المعسل) (مع/with tobacco التبغ؟

أخطط للإقلاع عن التدخين خلال الشهر المقبل /I am planning to quit within the next month (1(

أفكر في الإقلاع عن التدخين خلال الـ /I am thinking about quitting within the next 12 months 12 شهرًا القادمة)2(

سأقلع عن التدخين يومًا ما و لكن ليس/I will quit someday but not within the next 12 months خلال ال 12 شهرًا القادمة)3(

أنا لست مهتمًا بالإقلاع عن التدخين)4(/ I am not interested in quitting

لا أعرف /Don't know)5(

أفضل عدم الإجابة)6(/Prefer not to answer

During the past 12 months, have you tried to quit smoking waterpipe with tobacco/ خلال ال 12 شهراً الماضية، هل حاولت الإقلاع عن تدخين النرجيلة (الشيشة أو المعسل) (مع التبغ)؟

نعم)1(/Yes

لا)2(/No

أفضل عدم الإجابة)3(/Prefer not to answer

Thinking about the last time you tried to quit smoking waterpipe with tobacco, how long عند التفكير في آخر مرة حاولت فيها الإقلاع عن تدخين النرجيلة (الشيشة أو المعسل) (مع التبغ، كم/did you stop هي المدة التي توقفت فيها؟

(Pick a unit from the options below then enter the number in the following question/اختر وحدة من الخيارات أدناه ثم أدخل العدد في السؤال التالي)

شهور)1(/Months

أسابيع)2(/Weeks

أيام)3(/Days

أقل من يوم)4(/Less than 1 day

لا أعرف)5(/Don't know

أفضل عدم الإجابة)6(/Prefer not to answer

Enter number of months since you stopped smoking waterpipe with tobacco /أدخل عدد الشهور منذ أن توقفت عن تدخين النرجيلة (الشيشة أو المعسل) (مع التبغ):

_____

Enter number of weeks since you stopped smoking waterpipe with tobacco/أدخل عدد الأسابيع منذ أن توقفت عن تدخين النرجيلة (الشيشة أو المعسل) (مع التبغ):

_____

Enter number of days since you stopped smoking waterpipe with tobacco/أدخل عدد الأيام منذ
أن توقفت عن تدخين النرجيلة)الشيشة أو المعسل (مع التبغ:

_____

How long has it been since you stopped smoking waterpipe with tobacco/كم مضى منذ أن
توقفت عن تدخين النرجيلة)الشيشة أو المعسل (مع التبغ؟
(Pick a unit from the options below then enter the number in the following question/اختر
وحدة من الخيارات أدناه ثم أدخل العدد في السؤال التالي(

سنوات (Years/)1(
شهور (Months/)2(
أسابيع (Weeks/)3(
أيام (Days/)4(
أقل من يوم (Less than 1 day/)5(
لا أعرف (Don't know/)6(
أفضل عدم الإجابة (Prefer not to answer/)7(

Enter number of years since you stopped smoking waterpipe with tobacco/أدخل عدد السنوات
منذ أن توقفت عن تدخين النرجيلة)الشيشة أو المعسل (مع التبغ:

_____

Enter number of months since you stopped smoking waterpipe with tobacco/أدخل عدد
الشهور منذ أن توقفت عن تدخين النرجيلة)الشيشة أو المعسل (مع التبغ:

_____

Enter number of weeks since you stopped smoking waterpipe with tobacco/أدخل عدد
الأسابيع منذ أن توقفت عن تدخين النرجيلة)الشيشة أو المعسل (مع التبغ:

_____

Enter number of days since you stopped smoking waterpipe with tobaco/أدخل عدد الأيام منذ
أن توقفت عن تدخين النرجيلة)الشيشة أو المعسل (مع التبغ:

_____

End of Block: Waterpipe (Shisha/Nargile)

Now we want to ask you about **electronic cigarettes**, which are also called e-cigarettes or vaping devices. These devices are battery powered and heat a liquid to produce vapor or aerosol instead of smoke/ الآن نود أن نطرح عليك بعض الأسئلة المتعلقة **بالسجائر الكترونية**، و هي/
.عبارة عن أجهزة تعمل بالبطارية وتقوم بتسخين سائل لإنتاج بخار أو رذاذ بدلاً من الدخان

Have you ever, **even once**, used an electronic cigarette or any other vaping device/ هل سبق
لك، **ولو مرة واحدة**، استخدام سيجارة إلكترونية؟
 نعم (Yes/)1
 لا (No/)2
 لا أعرف (Don't know/)3
 أفضل عدم الإجابة (Prefer not to answer/)4

Have you ever used electronic cigarettes or any other vaping device daily or regularly **in
the past** /هل سبق لك استخدام السجائر الإلكترونية يوميًا أو بشكلٍ منتظم **في الماضي**؟
 نعم (Yes/)1
 لا (No/)2
 لا أعرف (Don't know/)3
 أفضل عدم الإجابة (Prefer not to answer/)4

Do you **currently** use electronic cigarettes or any other vaping device_____ / هل
تستخدم **حاليًا** السجائر الإلكترونية بشكل؟
 يومي (Daily/)1
 أقل من يومي و لكن بشكل منتظم (Less than daily but regularly/)2
 لا أدخن على الإطلاق (Not at all/)3
 لا أعرف (Don't know/)4
 أفضل عدم الإجابة (Prefer not to answer/)5

On average, how many **sessions of electronic cigarettes** do you currently use **each day**/
في المتوسط، كم عدد **جلسات السجائر الإلكترونية** التي تدخنها حالياً **كل يوم**؟
 _____

140

On average, how many **<u>sessions of electronic cigarettes</u>** do you currently use **<u>each week</u>**/ **<u>كل أسبوع</u>** في المتوسط، كم عدد **<u>جلسات السجائر الإلكترونية</u>** التي تدخنها حالياً؟

_____

How soon after you wake up do you usually start using your electronic cigarette/متى تبدأ بتدخين السيجارة الإلكترونية عادة بعد استيقاظك من النوم؟

Within 5 minutes/ (1 في غضون 5 دقائق
6 to 30 minutes/(2 في غضون 6 إلى 30 دقيقة
31 to 60 minutes/(3 في غضون 31 إلى 60 دقيقة
More than 60 minutes/ (4 أكثر من 60 دقيقة
Prefer not to answer/(5 أفضل عدم الإجابة

Which of the following are reasons that you use electronic cigarettes or any other vaping device/ أي من الأسباب التالية تجعلك تستخدم السجائر الإلكترونية؟

	نعم (1)/Yes	لا (2)/No	Prefer not to answer/ أفضل عدم الإجابة (3)
To quit smoking tobacco/ للإقلاع عن تدخين التبغ) 1؟)			
To avoid going back to smoking tobacco/ لتجنب العودة إلى تدخين التبغ) 2؟)			
Because I enjoy it/ لأنني أستمتع بها) 3؟)			
Because I'm addicted to it/ لأنني مدمن عليها؟ (4)			
I can use it at times when or in places where tobacco smoking is not allowed/ يمكنني استخدامها في بعض الأوقات أو الأماكن التي لا يُسمح فيها بتدخين التبغ) 5؟)			
It is less harmful than smoking tobacco/ إنها أقل ضررا من تدخين التبغ؟ (6)			
It comes in flavors I like/ تتوفر بنكهات أفضّلها) 7؟)			
A friend or family member uses them/ يستخدمها أحد الأصدقاء أو أفراد الأسرة) 8؟)			

Which of the following best describes your thinking about quitting electronic cigarette use/أي مما يلي يصف تفكيرك بشكل أفضل في الإقلاع عن تدخين السجائر الإلكترونية؟

I am planning to quit within the next month/ أخطط للإقلاع عن تدخين السجائر الإلكترونية خلال الشهر المقبل)1(

I am thinking about quitting within the next 12 months/ أفكر في الإقلاع عن تدخين السجائر الإلكترونية خلال الـ 12 شهرًا القادمة)2(

I will quit someday but not within the next 12 months/سأقلع عن تدخين السجائر يومًا ما و لكن ليس خلال ال 12 شهرًا القادمة)3(

I am not interested in quitting/ أنا لست مهتمًا بالإقلاع عن تدخين السجائر الإلكترونية)4(

Don't know/لا أعرف)5(

Prefer not to answer/أفضل عدم الإجابة)6(

During the past 12 months, have you tried to stop using electronic cigarettes/خلال ال 12 شهراً الماضية، هل حاولت الإقلاع عن تدخين السجائر الإلكترونية؟

Yes/نعم)1(

No/لا)2(

Prefer not to answer/أفضل عدم الإجابة)3(

Thinking about the last time you tried to quit using electronic cigarettes, how long did you stop/عند التفكير في آخر مرة حاولت فيها الإقلاع عن تدخين السجائر الإلكترونية، كم هي المدة التي توقفت فيها؟

(Pick a unit from the options below then enter the number in the following question/اختر وحدة من الخيارات أدناه ثم أدخل العدد في السؤال التالي)

Months/شهور)1(

Weeks/أسابيع)2(

Days/أيام)3(

Less than 1 day/أقل من يوم)4(

Don't know/لا أعرف)5(

Prefer not to answer/أفضل عدم الإجابة)6(

Enter number of months since you stopped using electronic cigarettes/أدخل عدد الشهور منذ أن توقفت عن تدخين السجائر الإلكترونية:

_____

Enter number of weeks since you stopped using electronic cigarettes/أدخل عدد الأسابيع منذ أن توقفت عن تدخين السجائر الإلكترونية:

_____

Enter number of days since you stopped using electronic cigarettes/أدخل عدد الأيام منذ أن توقفت عن تدخين السجائر الإلكترونية:

_____

How long has it been since you stopped using electronic cigarettes or any other vaping device/كم مضى منذ أن توقفت عن استخدام السجائر الإلكترونية؟
(Pick a unit from the options below then enter the number in the following question/اختر وحدة من الخيارات أدناه ثم أدخل العدد في السؤال التالي)

1(/Years) سنوات
2(/Months) شهور
3(/Weeks) أسابيع
4(/Days) أيام
5(/Less than 1 day) أقل من يوم
6(/Don't know) لا أعرف
7(/Prefer not to answer) أفضل عدم الإجابة

_____

Enter number of years since you stopped using electronic cigarettes/أدخل عدد السنوات منذ أن توقفت عن تدخين السجائر الإلكترونية:

_____

Enter number of months since you stopped using electronic cigarettes/أدخل عدد الشهور منذ أن توقفت عن تدخين السجائر الإلكترونية:

_____

Enter number of weeks since you stopped using electronic cigarettes/أدخل عدد الأسابيع منذ أن توقفت عن تدخين السجائر الإلكترونية:

_____

Enter number of days since you stopped using electronic cigarettes/أدخل عدد الأيام منذ أن توقفت عن تدخين السجائر الإلكترونية:

_____

144

During the past 12 months, did you use any of the following to try to stop tobacco use/
خلال ال 12 شهرًا الماضية، هل استخدمت أيًا مما يلي لمحاولة الإقلاع عن استخدام التبغ؟

	Yes/نعم (1)	No/لا (2)	Prefer not to answer/أفضل عدم الإجابة (3)
Counseling, including at a smoking cessation clinic/ الاستشارة، بما في ذلك عيادة الإقلاع عن التدخين (1)؟			
Nicotine replacement therapy, such as the patch or gum/ العلاج ببدائل النيكوتين، مثل اللصقة أو العلكة (2)؟			
Other prescription medications/ أدوية موصوفة أخرى (3)؟			
Traditional medicines/علاج شعبي؟ (4)			
A quit line or a smoking telephone support line/ خط الإقلاع عن التدخين أو خط الدعم الهاتفي الخاص بالتدخين (5)؟			
Using heated tobacco products instead/ استخدام منتجات التبغ المسخن بدلاً من ذلك (6)؟			
Try to quit without assistance/محاولة الإقلاع عن التدخين دون مساعدة (7)؟			

During any visit to a doctor or health care provider in the past 12 months, were you asked if you use tobacco /خلال أي زيارة لطبيب أو مقدم رعاية صحية خلال ال 12 شهرًا الماضية، هل سُئلت عما إذا كنت تستخدم التبغ؟

    نعم (Yes/)1

    لا (No/)2

I did not visit a doctor or health care provider in the past 12 months/ لم أقم بزيارة طبيب أو مقدم رعاية صحية خلال الـ 12 شهرًا الماضية (3)

Prefer not to answer/)4(أفضل عدم الإجابة

During any visit to a doctor or health care provider in the past 12 months, were you advised to quit tobacco use/ أثناء أي زيارة إلى طبيب أو مقدم رعاية صحية خلال ال 12 شهراً الماضية، هل تلقيت نصيحة بالإقلاع عن استخدام التبغ

    نعم (Yes/)1

    لا (No/)2

I did not visit a doctor or health care provider in the past 12 months/ لم أقم بزيارة طبيب أو مقدم رعاية صحية خلال الـ 12 شهرًا الماضية (3)

Prefer not to answer/)4(أفضل عدم الإجابة

The next question is asking about smoking tobacco such as cigarettes and waterpipe with tobacco/ السؤال التالي هو عن تدخين التبغ مثل السجائر والنرجيلة)الشيشة أو المعسل (مع التبغ.

Based on what you know or believe, does smoking tobacco cause serious illness/ بناءً على ما تعرفه أو تعتقده، هل يتسبب تدخين التبغ في مرض خطير؟

    نعم (Yes/)1

    لا (No/)2

    لا أعرف (Don't know/)3

    أفضل عدم الإجابة (Prefer not to answer/)4

Based on what you know or believe, does smoking tobacco cause the following/ ما على بناءً تعرفه أو تعتقده ، هل يتسبب تدخين التبغ في ما يلي:

	Yes/نعم)1(	No/لا)2(	Don't know/لا أعرف)3(	Prefer not to answer/أفضل عدم الإجابة)4(
الجلطة/Stroke الدماغية)1?(				
النوبة/Heart attack القلبية)2?(				
Lung cancer/سرطان الرئة)3?(				
داء/Diabetes السكري)4?(				
انتفاخ/Emphysema الرئة)5?(				
الربو)6/(Asthma				

Do you believe the following types of tobacco are addictive/هل تعتقد أن أنواع التبغ التالية تسبب الإدمان؟

	Yes/نعم)1(	No/لا)2(	Don't know/لا أعرف)3(	Prefer not to answer/أفضل عدم الإجابة)4(
Cigarettes/ السجائر)1(				
Waterpipe/ النرجيلة)الشيشة أو المعسل( )2(				
Electronic cigarettes/ السجائرالإلكترونية)3(				

147

Based on what you know or believe, does smoking waterpipe with tobacco cause serious illness/ بناءً على ما تعرفه أو تعتقده، هل يتسبب تدخين النرجيلة (الشيشة أو المعسل (مع التبغ في مرض خطير؟

Yes/)1(نعم

No/)2(لا

Don't know/)3(لا أعرف

Prefer not to answer/)4(أفضل عدم الإجابة

Compared to smoking cigarettes, do you think smoking waterpipe with tobacco is _____ / بالمقارنة مع تدخين السجائر ، هل تعتقد أن تدخين النرجيلة (الشيشة أو المعسل (مع التبغ/؟

Less harmful than cigarettes/)1(أقل ضررا من السجائر

No different/)2(لا فرق بينهما

More harmful than cigarettes/)3(أكثر ضررا من السجائر

Don't know/)4(لا أعرف

Prefer not to answer/)5(أفضل عدم الإجابة

Compared to smoking ordinary cigarettes, would you say that using electronic cigarettes or any other vaping device is _____ / بالمقارنة مع تدخين السجائر العادية ، هل يمكنك القول أن استخدام / السجائر الإلكترونية؟

Much less harmful than smoking ordinary cigarettes/ أقل ضررا بكثير من تدخين السجائر العادية)1(

A little less harmful than smoking ordinary cigarettes/ أقل ضررا بقليل من تدخين السجائر العادية (2)

About as harmful as smoking ordinary cigarettes/)3(تقريبًا ضارة مثل تدخين السجائر العادية

A little more harmful than smoking ordinary cigarettes/ أكثر ضررا بقليل من تدخين السجائر العادية)4(

Much more harmful than smoking ordinary cigarettes/ أكثر ضررا بكثير من تدخين السجائر العادية)5(

Don't know/)6(لا أعرف

Prefer not to answer/)7(أفضل عدم الإجابة

Do you support or oppose the law that prohibits smoking in indoor workplaces and public places, such as restaurants and coffee shops/ هل تؤيد أو تعارض القانون الذي يحظر التدخين في أماكن العمل الداخلية والأماكن العامة ، مثل المطاعم والمقاهي؟

Support/)1(أؤيد

Oppose/)2(أعارض

Don't know/)3(لا أعرف

Prefer not to answer/)4(أفضل عدم الإجابة

Do you support or oppose increasing taxes on tobacco products/ هل تؤيد أم تعارض زيادة الضرائب على منتجات التبغ؟

    Support/)1(أؤيد

    Oppose/)2(أعارض

    Don't know/)3(لا أعرف

    Prefer not to answer/)4(أفضل عدم الإجابة

End of Block: Knowledge, Attitudes & Perceptions

Appendix B. Survey Instrument for Specific Aim 2

This Section asks questions about your intentions, experiences, and perspectives on helping your patients quit smoking cigarettes, waterpipe, and other tobacco products that are smoked as well as using electronic cigarettes/ يطرح هذا القسم أسئلة حول نواياك، تجاربك، و وجهات نظرك حول مساعدة مرضاك على الإقلاع عن تدخين السجائر و النرجيلة (الشيشة أو المعسل (و أنواع التبغ الأخرى التي تدخن، بالإضافة إلى السجائر الإلكترونية.

How often do you ask your patients about their smoking status during their admission period/ كم مرة تسأل جميع مرضاك عن حالة التدخين لديهم أثناء فترة دخولهم المستشفى؟

○ أبدًا (0% من الوقت) (1)/ Never (0% of time)

○ نادرًا (1-25% من الوقت) (2)/ Rarely (1-25% of the time)

○ أحيانًا (26-50% من الوقت) (3)/ Occasionally (26-50% of the time)

○ في أغلب الأحيان (51-99% من الوقت) (4)/ Most of the time (51 to 99% of the time)

○ دائمًا (100% من الوقت) (5)/ Always (100% of the time)

Among your patients who currently use any type of tobacco such as cigarettes, waterpipe, or electronic cigarettes, to what extent do you engage in the following behaviors to promote smoking cessation/ من بين مرضاك الذين يستخدمون أي نوع من أنواع التبغ كالسجائر و النرجيلة (الشيشة أو المعسل (و السجائر الإلكترونية حاليًا ، إلى أي مدى تشارك في السلوكيات التالية للتشجيع على الإقلاع عن التدخين؟

	Never (0% of time)/أبدًا (من 0% من الوقت) (1)	Rarely (1-25% of the time)/نادرًا (من 1-25% من الوقت) (2)	Occasionally (26-50% of the time)/أحيانًا (من 26-50% من الوقت) (3)	Most of the time (51 to 99% of the time)/في أغلب الأحيان (من 51-99% من الوقت) (4)	Always (100% of the time)/دائمًا (من 100% من الوقت) (5)
Assess patient willingness to quit/تقييم استعداد المريض للإقلاع عن التدخين (1).	○	○	○	○	○
Advise patients to stop smoking/نصح المرضى بالتوقف عن التدخين (2).	○	○	○	○	○
Refer patients who smoke to others for appropriate cessation treatment/إحالة المرضى الذين يدخنون إلى الآخرين لتلقي العلاج المناسب للإقلاع عن التدخين. (3)	○	○	○	○	○
Recommend nicotine replacement therapy or other medications for smoking cessation/التوصية بالعلاج ببدائل النيكوتين أو الأدوية الأخرى للإقلاع عن التدخين (4).	○	○	○	○	○

Provide brochures/self-help materials/تقديم الكتيبات /مواد المساعدة الذاتية) .5(	◯	◯	◯	◯	◯
Arrange follow-up visits with patient to address smoking/ترتيب زيارات المتابعة مع المريض لمعالجة التدخين) .6(	◯	◯	◯	◯	◯
Monitor patient progress in attempting to quit/مراقبة تقدم المريض في محاولة الإقلاع عن التدخين. (7)	◯	◯	◯	◯	◯
Access the patient's records to review their tobacco status/الوصول إلى السجلات الصحية للمريض لمراجعة حالة التدخين) .8(	◯	◯	◯	◯	◯
Add data to the patient's record about tobacco or smoking cessation status or goals/إضافة بيانات إلى السجل الصحي للمريض حول حالة أو أهداف الإقلاع عن التدخين أو استخدام التبغ. (9)	◯	◯	◯	◯	◯

How would you rate the following as barriers to your ability to help your patients quit smoking /كيف تقيم ما يلي كعوائق أمام قدرتك على مساعدة مرضاك على الإقلاع عن التدخين؟

	Not a barrier/ ليس عائقا (1)	Somewhat of a barrier/(2) نوعا ما عائقا	A significant barrier/عائق بشكل كبير (3)
Too few cessation programs are available/يتوفر عدد قليل جدًا من برامج الإقلاع عن التدخين (1.	○	○	○
Patients have more immediate problems to address/المرضى لديهم مشاكل أكثر إلحاحاً يجب معالجتها (2.	○	○	○
I am unfamiliar with interventions to help smokers quit/لست على دراية بطرق مساعدة المدخنين على الإقلاع عن التدخين (3.	○	○	○
Patients are not motivated to quit/ لا يوجد دافع للمرضى للإقلاع عن التدخين (4.	○	○	○
Patients usually fail to quit/ عادة يفشل المرضى في الإقلاع عن التدخين (5.	○	○	○

To what extent do you agree or disagree with the following statements about helping your patients quit smoking /إلى أي مدى توافق أو لا توافق على العبارات التالية حول مساعدة مرضاك على الإقلاع عن التدخين؟

153

	Strongly disagree/أرفض بشدة (1)	Disagree/أرفض (2)	Neither agree nor disagree/لا أوافق و لا أرفض (3)	Agree/أوافق (4)	Strongly agree/أوافق بشدة (5)
I enjoy counseling patients about smoking cessation/أستمتع بتقديم المشورة للمرضى حول الإقلاع عن التدخين. (1)	○	○	○	○	○
I think counseling patients about smoking cessation is important/أعتقد بأن تقديم المشورة للمرضى حول الإقلاع عن التدخين أمر مهم. (2)	○	○	○	○	○
Counseling patients about smoking cessation can strengthen the RT-patient relationship/تقديم المشورة للمرضى حول الإقلاع عن التدخين يمكّن أن يقوي العلاقة بين المريض و المعالج التنفسي. (3)	○	○	○	○	○
I find that counseling patients about smoking cessation is personally rewarding/أجد أن تقديم المشورة للمرضى حول الإقلاع عن التدخين مفيد شخصيًا. (4)	○	○	○	○	○

154

Counseling patients about smoking cessation takes time away from more important tasks/ تقديم المشورة للمرضى حول الإقلاع عن التدخين يأخذ وقتًا من مهام أكثر أهمية) 5.(	○	○	○	○	○
Most patients referred to smoking cessation programs derive little or no benefit/ معظم المرضى المحالين إلى برامج الإقلاع عن التدخين لا يحصلون على فائدة تذكر) 6.(	○	○	○	○	○

To what extent do you agree or disagree with the following statements regarding expectations to help your patients quit smoking/ إلى أي مدى توافق أو لا توافق على العبارات التالية فيما يتعلق بالتوقعات لمساعدة مرضاك على الإقلاع عن التدخين؟

	Strongly disagree/أرفض بشدة (1)	Disagree/أرفض (2)	Neither agree nor disagree/لا أوافق و لا أرفض (3)	Agree/أوافق (4)	Strongly agree/أوافق بشدة (5)
My colleagues expect me to counsel smokers to quit/زملائي يتوقعون مني أن أنصح المدخنين بالإقلاع عن التدخين (1.)	○	○	○	○	○
My department has a specific policy of counseling smokers to quit/لدى قسمي سياسة محددة لتقديم المشورة للمدخنين للإقلاع عن التدخين (2.)	○	○	○	○	○
I feel a duty to counsel smokers to quit/أشعر أن تقديم المشورة للمدخنين للإقلاع عن التدخين واجبٌ عليّ (3.)	○	○	○	○	○

To what extent do you agree or disagree with the following statements regarding your ability to help your patients quit smoking/إلى أي مدى توافق أو لا توافق على العبارات التالية فيما يتعلق بقدرتك على مساعدة مرضاك على الإقلاع عن التدخين؟

	Strongly disagree/أرفض بشدة (1)	Disagree/أرفض (2)	Neither agree nor disagree/لا أوافق و لا أرفض (3)	Agree/أوافق (4)	Strongly agree/أوافق بشدة (5)
I am able to help smokers who want to quit even if they think it will be difficult to quit/أنا قادر/ على مساعدة المدخنين الذين يريدون الإقلاع عن التدخين حتى لو اعتقدوا أنه سيكون من الصعب الإقلاع عن التدخين) .1(	○	○	○	○	○
Helping my patients quit smoking is difficult to do at every admission/من الصعب مساعدة مرضاي على الإقلاع عن التدخين في كل دخول للمستشفى) .2(	○	○	○	○	○
I feel comfortable asking my patients about their smoking behaviors/أشعر بالراحة في طرح الأسئلة على مرضاي عن سلوكهم في التدخين) .3(	○	○	○	○	○

I know how to recommend medication for tobacco cessation (e.g., nicotine replacement/ bupropion/ varenicline)/ أعرف كيفية التوصية بأدوية الإقلاع عن تعاطي التبغ (مثل بدائل النيكوتين / البوبروبيون / الفارينيكلين) (4)	○	○	○	○	○
I believe I can provide counselling even when time is limited/ أعتقد أنه يمكنني تقديم المشورة حتى عندما يكون الوقت محدودًا. (5)	○	○	○	○	○

How well did the following prepare you to help patients quit smoking/كل أعدَّك مدى أي إلى
التدخين عن الإقلاع على المرضى لمساعدة يلي مما؟

	Not at all/على الإطلاق)1(	Somewhat/قليلا)2(	Very well/بشكل جيد جدا)3(	Not applicable/لا ينطبق)4(
Undergraduate education (e.g., diploma, bachelor's degree)/التعليم الجامعي)الدبلوم أو البكالوريوس( )1(	○	○	○	○
Advanced healthcare education (e.g., master's degree, PhD)/الدراسات العليا)الماجستير أو الدكتوراة( )2(	○	○	○	○
Continuing medical education (CME) or training/التعليم الطبي المستمر)3(	○	○	○	○

End of Block: TPB Questionnaire

Start of Block: Knowledge

For each statement about smoking and quitting smoking, please indicate which response is correct, or if you don't know the answer/ يرجى ، التدخين عن والإقلاع التدخين عن عبارة لكل
الإجابة تعرف لا كنت إذا أو ، الصحيحة الإجابة إلى الإشارة.

159

What percentage of smokers in Saudi Arabia say that they were planning or thinking about quitting smoking in the next 12 months/ ما هي نسبة المدخنين في السعودية الذين يقولون إنهم يخططون أو يفكرون في الإقلاع عن التدخين في الـ 12 شهرًا المقبلة؟

○ 23% (1)

○ 43% (2)

○ 63% (3)

○ 83% (4)

○ I don't know/)5(لا أعرف

○ Prefer not to answer/)6(أفضل عدم الإجابة

Compared to smokers who do not receive brief smoking cessation counseling from healthcare providers, those who do receive brief smoking cessation counseling are how many times as likely to quit smoking in the near future/ مقارنة بالمدخنين الذين لا يتلقون مشورة موجزة بشأن الإقلاع عن التدخين من مقدمي الرعاية الصحية، ما هو احتمالية الإقلاع عن التدخين في المستقبل القريب للذين يتلقون مشورة موجزة بشأن الإقلاع عن التدخين؟

○ نصف احتمالية الذين لا يتلقون المشورة)1(/Half as likely

○ نفس احتمالية الذين لا يتلقون المشورة)2(/Equally likely

○ ضعف احتمالية الذين لا يتلقون المشورة)3(/Twice as likely

○ ثلاثة أضعاف احتمالية الذين لا يتلقون المشورة)4(/Three times as likely

○ لا أعرف)5(/I don't know

○ أفضل عدم الإجابة)6(/Prefer not to answer

Which of the following statements about smoking cessation counseling are true/ أي من
العبارات التالية حول الاستشارة بشأن الإقلاع عن التدخين صحيحة؟

○ Counseling increases the effectiveness of smoking cessation medications/تزيد
المشورة من فعالية أدوية الإقلاع عن التدخين (1)

○ Counseling helps smokers deal with the behavioral challenges to quitting
smoking/المشورة تساعد المدخنين على التعامل مع التحديات السلوكية للإقلاع عن التدخين (2)

○ Counseling through 937 is free to smokers and effective at promoting cessation/
المشورة من خلال الرقم 937 مجانية للمدخنين وفعالة في تعزيز الإقلاع عن التدخين (3)

○ All of the above/(4) جميع ما سبق

○ I don't know/ (5) لا أعرف

○ Prefer not to answer/(6) أفضل عدم الإجابة

Varenicline, better known by the brand name Champix, should be taken for ____ days
prior to the quit date/يجب تناول الفارينكلين، المعروف باسم العلامة التجارية شامبكس، لمدة _____يومًا
قبل تاريخ الإقلاع عن التدخين.

○ 1 day/(1) يوم واحد

○ 2 to 3 days/2 (2) إلى 3 أيام

○ 4 to 6 days/4 (3) إلى 6 أيام

○ At least 7 days/(4) على الأقل 7 أيام

○ I don't know/ (5) لا أعرف

○ Prefer not to answer/(6) أفضل عدم الإجابة

What is the ideal number of months a smoker should take Champix to help them quit smoking and remain abstinent from cigarettes/ ما هو العدد المثالي للأشهر التي يجب أن يتناول فيها المدخن شامبكس لمساعدته على الإقلاع عن التدخين والامتناع عن السجائر؟

○ شهر واحد ( )1/ 1 month

○ شهور 3)2(/ 3 months

○ شهور 6)3(/ 6 months

○ شهراً)4(12/ 12 months

○ لا أعرف)5(/I don't know

○ أفضل عدم الإجابة)6(/Prefer not to answer

Many smokers report having vivid dreams when using the nicotine patch. How can this adverse effect be treated/كيف. يذكر العديد من المدخنين وجود أحلام واضحة عند استخدام لصقة النيكوتين كيف/يمكن معالجة هذا الأثر الجانبي؟

○ Smokers should be told to take the patch off before they go to bed/إرشاد أن يجب المدخنين بإزالة اللصقة قبل الذهاب إلى النوم)1(

○ Smokers should be told to use just half the patch at night/باستخدام المدخنين إرشاد يجب نصف اللصقة فقط في الليل)2(

○ Smokers should be told that they will have to learn how to live with vivid dreams/ جب إرشاد المدخنين أنه سيتعين عليهم تعلم كيفية التعايش مع الأحلام الواضحة)3(

○ Smokers should be told to use one patch every other day to reduce the dose some days/)4(يجب إرشاد المدخنين باستخدام لصقة واحدة كل يومين لتقليل الجرعة في بعض الأيام days/

○ لا أعرف)5(/I don't know

○ أفضل عدم الإجابة)6(/Prefer not to answer

162

Which dose of nicotine patch should a smoker use if she smokes 1 pack of cigarettes per day / ما هي جرعة لصقة النيكوتين التي يجب أن تستخدمها المدخنة إذا كانت تدخن علبة سجائر واحدة يوميًا؟

○ 7 mg patch/)1(لصقة 7 مجم

○ 14 mg patch/)2(لصقة 14 مجم

○ 21 mg patch/)3(لصقة 21 مجم

○ 2, 21 mg patches/)4(لصقتان 21 مجم

○ I don't know/)5(لا أعرف

○ Prefer not to answer/)6(أفضل عدم الإجابة

End of Block: Knowledge

Start of Block: Intention

On a scale of 0 to 10, with 0 being "never" and 10 being "always", how often do you intend to provide smoking cessation advice in your clinical rounds to patients who ____ smoke / على مقياس من 0 إلى 10، حيث 0 يشير إلى "أبدًا "و 10 يشير إلى "دائمًا"، كم مرة تنوي تقديم ____ نصائح حول الإقلاع عن التدخين في جولاتك السريرية للمرضى الذين يدخنون ____؟

	0 (1)	1 (2)	2 (3)	3 (4)	4 (5)	5 (6)	6 (7)	7 (8)	8 (9)	9 (10)	10 (11)
cigarettes/ السجائر) ?1(	○	○	○	○	○	○	○	○	○	○	○
waterpipe/ النرجيلة الشيشة أو) (المعسل)? (2)	○	○	○	○	○	○	○	○	○	○	○
e-cigarettes/ السجائر الإلكترونية? (3)	○	○	○	○	○	○	○	○	○	○	○

End of Block: Intention

Start of Block: Interest_Contact

Are you interested in taking a free online course to train you in smoking cessation counseling/هل لديك رغبة بالمشاركة في دورة تدريبية مجانية لتدريبك على تقديم المشورة للإقلاع عن التدخين؟

   ◯ No (1)

   ◯ Yes (2)

Please provide your first name/الرجاء تقديم الاسم الأول:

   _____

Please provide your last name/الرجاء تقديم اسم العائلة:

   _____

| ✱ |

Please provide your email address/الرجاء تقديم عنوان البريد الإلكتروني:

   _____

End of Block: Interest_Contact

Appendix C. Survey Instrument for Specific Aim 3 (Pre-training)

Pre-Cessation Training (RTs)

Thank you for taking the survey. This survey asks about your role in tobacco use and tobacco cessation. This important information will help researchers and policy makers understand the potential role of respiratory therapists in combatting tobacco use. The survey is composed of several sections and will take about 10 minutes to complete. All responses will be confidential and study results will only be reported in aggregate form/شكرًا لك على المشاركة في الاستبيان. يطرح هذا الاستبيان أسئلة عن دورك في استخدام التبغ والإقلاع عنه. ستساعد هذه المعلومات المهمة الباحثين وصناع القرار على فهم الدور المحتمل لأخصائيي العلاج التنفسي في مكافحة استخدام التبغ. يتكون الاستبيان من عدة أقسام ويستغرق إكماله حوالي 10 دقائق. ستكون جميع الردود سرية. ولن يتم الإفادة عن نتائج الدراسة إلا في شكل إجمالي.

This Section asks questions about your intentions, experiences, and perspectives on helping your patients quit smoking cigarettes, waterpipe, and other tobacco products that are smoked as well as using electronic cigarettes/ يطرح هذا القسم أسئلة حول نواياك، تجاربك، و وجهات نظرك حول مساعدة مرضاك على الإقلاع عن تدخين السجائر و النرجيلة (الشيشة أو المعسل (و أنواع التبغ الأخرى التي تدخن، بالإضافة إلى السجائر الإلكترونية.

To what extent do you agree or disagree with the following statements about helping your patients quit smoking/ إلى أي مدى توافق أو لا توافق على العبارات التالية حول مساعدة مرضاك على الإقلاع عن التدخين؟

165

	Strongly disagree/أرفض بشدة (1)	Disagree/أرفض (2)	Neither agree nor disagree/لا أوافق و لا أرفض (3)	Agree/أوافق (4)	Strongly agree/أوافق بشدة (5)
I enjoy counseling patients about smoking cessation/أستمتع بتقديم المشورة للمرضى حول الإقلاع عن التدخين. (1)					
I think counseling patients about smoking cessation is important/أعتقد بأن تقديم المشورة للمرضى حول الإقلاع عن التدخين أمر مهم. (2)					
Counseling patients about smoking cessation can strengthen the RT-patient relationship/تقديم المشورة للمرضى حول الإقلاع عن التدخين يمكّن أن يقوي العلاقة بين المريض و المعالج التنفسي. (3)					
I find that counseling patients about smoking cessation is personally rewarding/أجد أن تقديم المشورة للمرضى حول الإقلاع عن التدخين مفيد شخصيًا. (4)					

166

Counseling patients about smoking cessation takes time away from more important tasks/ تقديم المشورة للمرضى حول الإقلاع عن التدخين يأخذ وقتًا من مهام أكثر أهمية) .5(

Most patients referred to smoking cessation programs derive little or no benefit/ معظم المرضى المحالين إلى برامج الإقلاع عن التدخين لا يحصلون على فائدة تذكر) .6(

To what extent do you agree or disagree with the following statements regarding expectations to help your patients quit smoking/ إلى أي مدى توافق أو لا توافق على العبارات التالية فيما يتعلق بالتوقعات لمساعدة مرضاك على الإقلاع عن التدخين؟

	Strongly disagree/أرفض بشدة (1)	Disagree/أرفض (2)	Neither agree nor disagree/لا أوافق و لا أرفض (3)	Agree/أوافق (4)	Strongly agree/أوافق بشدة (5)
My colleagues expect me to counsel smokers to quit/زملائي يتوقعون مني أن أنصح المدخنين بالإقلاع عن التدخين. (1)					
My department has a specific policy of counseling smokers to quit/لدى قسمي سياسة محددة لتقديم المشورة للمدخنين للإقلاع عن التدخين. (2)					
I feel a duty to counsel smokers to quit/أشعر أن تقديم المشورة للمدخنين للإقلاع عن التدخين واجبٌ علي. (3)					

To what extent do you agree or disagree with the following statements regarding your ability to help your patients quit smoking/ إلى أي مدى توافق أو لا توافق على العبارات التالية فيما يتعلق بقدرتك على مساعدة مرضاك على الإقلاع عن التدخين؟

	Strongly disagree/أرفض بشدة (1)	Disagree/أرفض (2)	Neither agree nor disagree/لا أوافق و لا أرفض (3)	Agree/أوافق (4)	Strongly agree/أوافق بشدة (5)
I am able to help smokers who want to quit even if they think it will be difficult to quit/أنا قادر على مساعدة المدخنين الذين يريدون الإقلاع عن التدخين حتى لو اعتقدوا أنه سيكون من الصعب الإقلاع عن التدخين. (1)					
Helping my patients quit smoking is difficult to do at every admission/من الصعب مساعدة مرضاي على الإقلاع عن التدخين في كل دخول للمستشفى. (2)					
I feel comfortable asking my patients about their smoking behaviors/ أشعر بالراحة في طرح الأسئلة على مرضاي عن سلوكهم في التدخين. (3)					

| | I know how to recommend medication for tobacco cessation (e.g., nicotine replacement/ bupropion/ varenicline)/ أعرف كيفية التوصية بأدوية الإقلاع عن تعاطي التبغ)مثل بدائل النيكوتين / البوبروبيون / الفارينيكلين) (4(|
| | I believe I can provide counselling even when time is limited/ أعتقد أنه يمكنني تقديم المشورة حتى عندما يكون الوقت محدودًا(. 5(|

On a scale of 0 to 10, with 0 being "never" and 10 being "always", how often do you intend to provide smoking cessation advice in your clinical rounds to patients who smoke_____/ على مقياس من 0 إلى 10، حيث 0 يشير إلى "أبدًا "و 10 يشير إلى "دائمًا"، كم مرة تنوي تقديم / نصائح حول الإقلاع عن التدخين في جولاتك السريرية للمرضى الذين يدخنون___؟

	0 (1)	1 (2)	2 (3)	3 (4)	4 (5)	5 (6)	6 (7)	7 (8)	8 (9)	9 (10)	10 (11)
cigarettes/ السجائر ?)1(											
waterpipe/ النرجيلة)الشيشة أو المعسل) ?)2(											
e-cigarettes/ السجائر الإلكترونية? (3)											

How often do you ask your patients about their smoking status during their admission period/ كم مرة تسأل جميع مرضاك عن حالة التدخين لديهم أثناء فترة دخولهم المستشفى؟

Never (0% of time)/1) (%من الوقت 0) أبدًا
Rarely (1-25% of the time)/2) (%من الوقت 25-1) نادرًا
Occasionally (26-50% of the time)/3) (%من الوقت 50-26) أحيانًا
Most of the time (51 to 99% of the time)/4) (%من الوقت 99-51) في أغلب الأحيان
Always (100% of the time)/5) (%من الوقت 100) دائمًا

Among your patients who currently use any type of tobacco such as cigarettes, waterpipe, or electronic cigarettes, to what extent do you engage in the following behaviors to promote smoking cessation/ من بين مرضاك الذين يستخدمون أي نوع من أنواع التبغ كالسجائر و النرجيلة (الشيشة أو المعسل (و السجائر الإلكترونية حاليًا ، إلى أي مدى تشارك في السلوكيات التالية للتشجيع على الإقلاع عن التدخين؟

171

	Never (0% of time)/أبدًا (من 0% الوقت) (1)	Rarely (1-25% of the time)/نادرًا (من 1-25% الوقت) (2)	Occasionally (26-50% of the time)/أحيانًا (من 26-50% الوقت) (3)	Most of the time (51 to 99% of the time)/في أغلب الأحيان (51- الوقت) (4)	Always (100% of the time)/دائمًا (من100% الوقت) (5)
Assess patient willingness to quit/تقييم استعداد المريض للإقلاع عن التدخين) .1(					
Advise patients to stop smoking/نصح المرضى بالتوقف عن التدخين) .2(					
Refer patients who smoke to others for appropriate cessation treatment/إحالة المرضى الذين يدخنون إلى الآخرين لتلقي العلاج المناسب للإقلاع عن التدخين) .3(					
Recommend nicotine replacement therapy or other medications for smoking cessation/التوصية بالعلاج ببدائل النيكوتين أو الأدوية الأخرى للإقلاع عن التدخين. (4)					
Provide brochures/self-help materials/تقديم الكتيبات / مواد المساعدة الذاتية) .5(					
Arrange follow-up visits with patient to address smoking/ترتيب زيارات المتابعة مع المريض لمعالجة التدخين) .6(					

Monitor patient progress in attempting to quit/مراقبة تقدم المريض في محاولة الإقلاع عن التدخين (7.)

Access the patient's records to review their tobacco status/الوصول إلى السجلات الصحية للمريض لمراجعة حالة التدخين (8.)

Add data to the patient's record about tobacco or smoking cessation status or goals/إضافة بيانات إلى السجل الصحي للمريض حول حالة أو أهداف الإقلاع عن التدخين أو استخدام التبغ. (9)

How would you rate the following as barriers to your ability to help your patients quit smoking/ كيف تقيم ما يلي كعوائق أمام قدرتك على مساعدة مرضاك على الإقلاع عن التدخين؟

	Not a barrier/ ليس عائقا (1)	Somewhat of a barrier/(2) نوعا ما عائقا	A significant barrier/ عائق بشكل كبير (3)
Too few cessation programs are available/ يتوفر عدد قليل جدًا من برامج الإقلاع عن التدخين (1.)			
Patients have more immediate problems to address/ المرضى لديهم مشاكل أكثر إلحاحاً يجب معالجتها (2.)			
I am unfamiliar with interventions to help smokers quit/ لست على دراية بطرق مساعدة المدخنين على الإقلاع عن التدخين (3.)			
Patients are not motivated to quit/ لا يوجد دافع للمرضى للإقلاع عن التدخين (4.)			
Patients usually fail to quit/ عادة يفشل المرضى في الإقلاع عن التدخين (5.)			

End of Block: TPB Questionnaire

Start of Block: Tobacco Use

The Next sections ask about tobacco products use. There are specific questions for cigarettes, waterpipe, and electronic cigarettes/ الأقسام القادمة تقدم أسئلة عن استخدام منتجات التبغ. يوجد أسئلة محددة لكلٍ من السجائر، النرجيلة (الشيشة أو المعسل)، والسجائر الإلكترونية.

Do you currently use any of the following tobacco products on daily or less than daily basis _____ هل تقوم حالياً باستخدام أي من منتجات التبغ التالية بشكل يومي أو أقل من يومي؟ [check all that applies/ حدد كل ما ينطبق]

☐   السجائر   (Cigarettes/)1(

☐   النرجيلة)الشيشة أو المعسل (مع التبغ)   )4(/Waterpipe with tobacco

☐   السجائر الإلكترونية   )5(/Electronic cigarettes

☐   لا أستخدم أي من هذه المنتجات على الإطلاق   )6(/Not at all

☐   لا أعرف   )7(/Don't know

☐   أفضل عدم الإجابة   )8(/Prefer not to answer

On average, how many **cigarettes** do you currently smoke **each day** (remember, 1 pack is 20 cigarettes)/في المتوسط، كم عدد **السجائر** التي تدخنها حالياً **كل يوم**)علماً بأن علبة السجائر تحتوي على 20 سيجارة(؟

_____

How soon after you wake up do you usually have your first cigarette/متى تقوم بتدخين أول سيجارة عادة بعد استيقاظك من النوم؟
في غضون 5 دقائق   )1(/Within 5 minutes
في غضون 6 إلى 30 دقيقة   )2(/6 to 30 minutes
في غضون 31 إلى 60 دقيقة   )3(/31 to 60 minutes
أكثر من 60 دقيقة   )4(/More than 60 minutes
أفضل عدم الإجابة   )5(/Prefer not to answer

On average, how many **sessions of waterpipe with tobacco** do you currently smoke **each day**/في المتوسط، كم عدد **جلسات النرجيلة)الشيشة أو المعسل (مع التبغ** التي تدخنها حالياً **كل يوم**؟

_____

175

How soon after you finish smoking waterpipe with tobacco do you usually start to feel a strong desire, which is hard to ignore, to use waterpipe with tobacco or any other form of tobacco/ بعد الانتهاء من تدخين النرجيلة)الشيشة أو المعسل)مع التبغ، متى تبدأ عادة في الشعور برغبة قوية والتي يصعب تجاهلها، لاستخدام النرجيلة)الشيشة أو المعسل)مع التبغ أو أي شكل آخر من أشكال التبغ؟

في غضون 60 دقيقة 1(/Within 60 minutes

بعد 1 إلى 3 ساعات 2(/after 1 to 3 hours

أكثر من 3 ساعات و لكن أقل من يوم كامل 3(/More than 3 hours but less than one full day

يوم أو أكثر 4(/1 day or more

أبداً 5(/Never

لا أعرف 6(/Don't know

أفضل عدم الإجابة 7(/Prefer not to answer

On average, how many **sessions of electronic cigarettes** do you currently use **each day**/ في المتوسط، كم عدد **جلسات السجائر الإلكترونية** التي تدخنها حالياً **كل يوم**؟

_____

How soon after you wake up do you usually start using your electronic cigarette/متى تبدأ بتدخين السيجارة الإلكترونية عادة بعد استيقاظك من النوم؟

في غضون 5 دقائق 1(/Within 5 minutes

في غضون 6 إلى 30 دقيقة 2(/6 to 30 minutes

في غضون 31 إلى 60 دقيقة 3(/31 to 60 minutes

أكثر من 60 دقيقة 4(/More than 60 minutes

أفضل عدم الإجابة 5(/Prefer not to answer

End of Block: Tobacco Use

Start of Block: Quit Interest and Attempts

Which of the following best describes your thinking about quitting any of the tobacco products you are using/أي مما يلي يصف بشكل أفضل تفكيرك في الإقلاع عن أي من منتجات التبغ التي/تستخدمها؟

أخطط للإقلاع عن تدخين السجائر خلال الشهر المقبل 1(/I am planning to quit within the next month

أفكر في الإقلاع خلال الـ 12 شهرًا القادمة 2(/I am thinking about quitting within the next 12 months

سأقلع يومًا ما و لكن ليس خلال ال 12 شهرًا القادمة 3(/I will quit someday but not within the next 12 months

أنا لست مهتمًا بالإقلاع عن استخدام منتجات التبغ 4(/I am not interested in quitting

لا أعرف 5(/Don't know

أفضل عدم الإجابة 6(/Prefer not to answer

During the past 12 months, have you tried to stop using any of the tobacco products you are using even for 1 day/خلال ال 12 شهراً الماضية، هل حاولت الإقلاع عن استخدام أي من منتجات التبغ التي تستخدمها ولو ليوم واحد؟

    نعم (Yes/)1
    لا (No/)2
    أفضل عدم الإجابة (Prefer not to answer/)3

This section profiles your background and current medical practice and training/يتمحور هذا القسم حول خلفيتك والممارسة الطبية الحالية والتدريب

What is your gender/ما جنسك؟
    ذكر (Male/)1
    أنثى (Female/)2
    أفضل عدم الإجابة (Prefer not to answer/)3

What is your nationality/ما جنسيتك؟
    سعودي (Saudi/)1
    أخرى (Other/)2: _____

How old are you/كم عمرك؟

▼ 18 (1) ... 107 (267)

What is your marital status/ما حالتك الاجتماعية؟
    متزوج (Married/)1
    أعزب (Single/)2
    مطلّق (Divorced/)3
    أرمل (Widowed/)4
    أفضل عدم الإجابة (Prefer not to answer/)5

What is the highest level of education you have completed/ما أعلى مستوى تعليمي حصلت عليه؟
    Diploma/)1(دبلوم
    Bachelor's degree/)2(بكالوريوس
    Master's degree/)3(ماجستير
    Doctoral degree/)4(دكتوراة
    Other/)5: (أخرى _____
    Prefer not to answer/)6(أفضل عدم الإجابة

Which monthly income group does your household fall under/ما فئة الدخل الشهري التي يندرج تحتها دخل أسرتك؟
    Less than 5000 SAR/)1(أقل من 5000 ر.س
    5000 – 10000 SAR (2)
    10001 – 15000 SAR (3)
    15001 – 20000 SAR (4)
    More than 20000 SAR/)5(أكثر من 20000 ر.س
    Prefer not to answer/)6(أفضل عدم الإجابة

To what type of patients do you provide care/ما نوع المرضى الذين تقدم لهم الرعاية؟ [check all that apply /حدد كل ما ينطبق]

☐   Adult/)1(الكبار

☐   Pediatric/)2(الأطفال

☐   Neonatal/)3(حديثي الولادة

☐   Other/)5(: أخرى
    _____

☐   Prefer not to answer/)6(أفضل عدم الإجابة

What areas of the hospital do you cover/ما مناطق المستشفى التي تغطيها؟ [check all that apply/حدد كل ما ينطبق]

☐ وحدات العناية المركزة (1)(/Intensive care units

☐ أجنحة (2)(/Wards

☐ وحدات الرعاية طويلة الأمد (3)(/Long-term care units

☐ قسم الطوارئ (4)(/Emergency department

☐ مختبر وظائف الرئة (5)(/Pulmonary function lab

☐ مختبر دراسات النوم (6)/Sleep lab

☐ الرعاية المنزلية (7)(/Home care

☐ أخرى (8)/Other

_____

☐ أفضل عدم الإجابة (9)/Prefer not to answer

في أي عام بدأت العمل كأخصائي علاج تنفسي/In what year did you start working as an RT?

| Month (1) | ▼ January (1) ... (124) |
| Year (3) | ▼ January (1) ... (124) |

For each statement about smoking and quitting smoking, please indicate which response is correct, or if you don't know the answer /يرجى لكل عبارة عن التدخين والإقلاع عن التدخين ، الإشارة إلى الإجابة الصحيحة ، أو إذا كنت لا تعرف الإجابة.

What percentage of smokers in Saudi Arabia say that they were planning or thinking about quitting smoking in the next 12 months/ ما هي نسبة المدخنين في السعودية الذين يقولون إنهم يخططون أو يفكرون في الإقلاع عن التدخين في الـ 12 شهرًا المقبلة؟
- 23% (1)
- 43% (2)
- 63% (3)
- 83% (4)
- لا أعرف (I don't know/)5)

Cigarette smoking is causally linked to which of the following diseases/ تدخين السجائر يسبب أي من الأمراض التالية؟ [Check all that apply/ حدد كل ما ينطبق]

☐ سرطان الرئة (Lung cancer/)1)

☐ سرطان البنكرياس (Pancreatic cancer/)7)

☐ الربو (Asthma/)8)

☐ مرض النفخة الرئوية المزمن (COPD/)9)

☐ لا أعرف (I don't know/)2)

In patients with asthma, smoking **_reduces_** which of the following/ عند مرضى الربو، ☐☐☐☐ التدخين أي مما يلي؟
- الاستجابة للعلاج بالكورتيكوستيرويدات المستنشقة والجهازية (The response to treatment with inhaled and systemic corticosteroids/)1)
- خطر تفاقم الربو عند البالغين (The risk of asthma exacerbations in adults/)11)
- احتمالية الإصابة بالربو عند الرضع/الأطفال (The likelihood of developing asthma in infants/children/)12)
- احتمالية الإصابة بالربو الحاد عند الرضع/الأطفال (The likelihood of severe asthma in infants/children/)13)
- لا أعرف (I don't know/)14)

180

Pulse oximetry reading in smokers are almost always/تكون قراءة قياس نسبة الأكسجين عبر النبض عند المدخنين دائمًا تقريبًا

مرتفعة بشكل خاطئ (Falsely high/)1

منخفضة بشكل خاطئ (Falsely low/)15

دقيقة (Accurate/)16

لا أعرف (I don't know/)14

To achieve maximal treatment effectiveness, tobacco dependence treatment should address/لتحقيق أقصى قدر من فعالية العلاج، يجب على علاج الاعتماد على التبغ أن يعالج

الجانب السلوكي للاعتماد على التبغ (The behavioral aspect of tobacco dependence/)15

الجانب الفسيولوجي للاعتماد على التبغ (The physiological aspect of tobacco dependence/)18

أحد جوانب الاعتماد على التبغ (Either aspect of tobacco dependence/)19

كلا الجانبين من الاعتماد على التبغ (Both aspects of tobacco dependence/)20

لا أعرف (I don't know/)14

أي مما يلي ☐☐☐ من أعراض/Which of the following is **_NOT_** a nicotine withdrawal symptom/انسحاب النيكوتين؟

القلق (Anxiety/)15

الانفعال /الإحباط /الغضب (Irritability/frustration/anger/)21

الأرق (Insomnia/)22

قلة الشهية /فقدان الوزن (Decreased appetite/weight loss/)23

لا أعرف (I don't know/)14

Compared to smokers who do not receive brief smoking cessation counseling from healthcare providers, those who do receive brief smoking cessation counseling are how many times as likely to quit smoking in the near future/مقارنة بالمدخنين الذين لا يتلقون مشورة موجزة بشأن الإقلاع عن التدخين من مقدمي الرعاية الصحية، ما هو احتمالية الإقلاع عن التدخين في المستقبل القريب للذين يتلقون مشورة موجزة بشأن الإقلاع عن التدخين؟

نصف احتمالية الذين لا يتلقون المشورة (Half as likely/)1

نفس احتمالية الذين لا يتلقون المشورة (Equally likely/)2

ضعف احتمالية الذين لا يتلقون المشورة (Twice as likely/)3

ثلاثة أضعاف احتمالية الذين لا يتلقون المشورة (Three times as likely/)4

لا أعرف (I don't know/)5

أفضل عدم الإجابة (Prefer not to answer/)6

Which of the following is ___NOT___ a part of the 5 A's/ أجزاء من الـ 5 أي مما يلي ليس جزءًا من الـ 5
الرئيسية لمساعدة المرضى على الإقلاع عن التدخين؟

اسأل (Ask/)3

انصح (Advise/)7

نفذ (Act/)8

ساعد (Assist/)9

لا أعرف (I don't know/)5

Varenicline, better known by the brand name Champix, should be taken for ___ days prior to the quit date/ يجب تناول الفارينكلين، المعروف باسم العلامة التجارية شامبكس، لمدة _____ يومًا قبل تاريخ الإقلاع عن التدخين.

يوم واحد (1 day/)1

إلى 3 أيام (2 to 3 days/2) 2

إلى 6 أيام (4 to 6 days/4) 3

على الأقل 7 أيام (At least 7 days/)4

لا أعرف (I don't know/)5

أفضل عدم الإجابة (Prefer not to answer/)6

Which dose of nicotine patch should a smoker use if she smokes 1 pack of cigarettes per day/ ما هي جرعة لصقة النيكوتين التي يجب أن تستخدمها المدخنة إذا كانت تدخن علبة سجائر واحدة يوميًا؟

لصقة 7 مجم (7 mg patch/)1

لصقة 14 مجم (14 mg patch/)2

لصقة 21 مجم (21 mg patch/)3

لصقتان 21 مجم (2, 21 mg patches/)4

لا أعرف (I don't know/)5

أفضل عدم الإجابة (Prefer not to answer/)6

End of Block: Knowledge

Immediately Post-Cessation Training

Thank you for taking the survey. This survey asks about your role in tobacco use and tobacco cessation. This important information will help researchers and policy makers understand the potential role of respiratory therapists in combatting tobacco use. The survey is composed of several sections and will take about 10 minutes to complete. All responses will be confidential and study results will only be reported in aggregate form/شكرًا لك على المشاركة في الاستبيان .يطرح هذا الاستبيان أسئلة عن دورك في استخدام التبغ والإقلاع عنه. ستساعد هذه المعلومات المهمة الباحثين وصناع القرار على فهم الدور المحتمل لأخصائيي العلاج التنفسي في مكافحة استخدام التبغ .يتكون الاستبيان من عدة أقسام ويستغرق إكماله حوالي 10 دقائق .ستكون جميع الردود سرية ولن يتم الإفادة عن نتائج الدراسة إلا في شكل إجمالي.

This Section asks questions about your intentions, experiences, and perspectives on helping your patients quit smoking cigarettes, waterpipe, and other tobacco products that are smoked as well as using electronic cigarettes/ يطرح هذا القسم أسئلة حول نواياك، تجاربك، و وجهات نظرك حول مساعدة مرضاك على الإقلاع عن تدخين السجائر و النرجيلة (الشيشة أو المعسل (و أنواع التبغ الأخرى التي تدخن، بالإضافة إلى السجائر الإلكترونية.

To what extent do you agree or disagree with the following statements about helping your patients quit smoking/ إلى أي مدى توافق أو لا توافق على العبارات التالية حول مساعدة مرضاك على الإقلاع عن التدخين؟

	Strongly disagree/أرفض بشدة)1(	Disagree/أرفض (2)	Neither agree nor disagree/ل ا أوافق و لا أرفض)3(	Agree/أوافق (4)	Strongly agree/أوافق بشدة)5(
I enjoy counseling patients about smoking cessation/أستمتع بتقديم المشورة للمرضى حول الإقلاع عن التدخين.)1(					
I think counseling patients about smoking cessation is important/أعتقد بأن تقديم المشورة للمرضى حول الإقلاع عن التدخين أمر مهم. (2)					
Counseling patients about smoking cessation can strengthen the RT-patient relationship/تقديم المشورة للمرضى حول الإقلاع عن التدخين يمكن أن يقوي العلاقة بين المريض و المعالج التنفسي.)3(					
I find that counseling patients about smoking cessation is personally rewarding/أجد أن تقديم المشورة للمرضى حول الإقلاع عن التدخين مفيد شخصيًا.)4(					

184

Counseling patients about smoking cessation takes time away from more important tasks/ تقديم المشورة للمرضى حول الإقلاع عن التدخين يأخذ وقتًا من مهام أكثر أهمية) .5(	
Most patients referred to smoking cessation programs derive little or no benefit/ معظم المرضى المحالين إلى برامج الإقلاع عن التدخين لا يحصلون على فائدة تذكر) .6(	

To what extent do you agree or disagree with the following statements regarding expectations to help your patients quit smoking/ إلى أي مدى توافق أو لا توافق على العبارات التالية فيما يتعلق بالتوقعات لمساعدة مرضاك على الإقلاع عن التدخين؟

	Strongly disagree/أرفض بشدة (1)	Disagree/أرفض (2)	Neither agree nor disagree/لا أوافق و لا أرفض (3)	Agree/أوافق (4)	Strongly agree/أوافق بشدة (5)
My colleagues expect me to counsel smokers to quit/زملائي يتوقعون مني أن أنصح المدخنين بالإقلاع عن التدخين (1.)					
My department has a specific policy of counseling smokers to quit/لدى قسمي سياسة محددة لتقديم المشورة للمدخنين للإقلاع عن التدخين (2.)					
I feel a duty to counsel smokers to quit/أشعر أن تقديم المشورة للمدخنين للإقلاع عن التدخين واجبٌ عليّ (3.)					

To what extent do you agree or disagree with the following statements regarding your ability to help your patients quit smoking/إلى أي مدى توافق أو لا توافق على العبارات التالية فيما يتعلق بقدرتك على مساعدة مرضاك على الإقلاع عن التدخين؟

186

	Strongly disagree/أرفض بشدة)1(	Disagree/أرفض)2(	Neither agree nor disagree/لا أوافق و لا أرفض)3(	Agree/أوافق)4(	Strongly agree/أوافق بشدة)5(
I am able to help smokers who want to quit even if they think it will be difficult to quit/أنا قادر على مساعدة المدخنين الذين يريدون الإقلاع عن التدخين حتى لو اعتقدوا أنه سيكون من الصعب الإقلاع عن التدخين) .1(					
Helping my patients quit smoking is difficult to do at every admission/من الصعب مساعدة مرضاي على الإقلاع عن التدخين في كل دخول للمستشفى) .2(					
I feel comfortable asking my patients about their smoking behaviors/أشعر بالراحة في طرح الأسئلة على مرضاي عن سلوكهم في التدخين) .3(					

187

I know how to recommend medication for tobacco cessation (e.g., nicotine replacement/ bupropion/ varenicline)/ أعرف كيفية التوصية بأدوية الإقلاع عن تعاطي التبغ)مثل بدائل النيكوتين / البوبروبيون / الفارينيكلين) (4)
I believe I can provide counselling even when time is limited/ أعتقد أنه يمكنني تقديم المشورة حتى عندما يكون الوقت محدودًا. (5)

On a scale of 0 to 10, with 0 being "never" and 10 being "always", how often do you intend to provide smoking cessation advice in your clinical rounds to patients who

على مقياس من 0 إلى 10، حيث 0 يشير إلى "أبدًا "و 10 يشير إلى "دائمًا"، كم مرة تنوي تقديم / smoke_____
نصائح حول الإقلاع عن التدخين في جولاتك السريرية للمرضى الذين يدخنون ___؟

	0 (1)	1 (2)	2 (3)	3 (4)	4 (5)	5 (6)	6 (7)	7 (8)	8 (9)	9 (10)	10 (11)
cigarettes/ السجائر) 1?(											
waterpipe/ النرجيلة الشيشة أو) (المعسل?((2)											
e-cigarettes/ السجائر الإلكترونية? (3)											

Page Break

189

How would you rate the following as barriers to your ability to help your patients quit smoking /كيف تقيم ما يلي كعوائق أمام قدرتك على مساعدة مرضاك على الإقلاع عن التدخين؟

	Not a barrier/ ليس عائقا (1)	Somewhat of a barrier/(نوعا ما عائقا (2)	A significant barrier/عائق بشكل كبير (3)
Too few cessation programs are available/يتوفر عدد قليل جدًا من برامج الإقلاع عن التدخين. (1)			
Patients have more immediate problems to address/المرضى لديهم مشاكل أكثر إلحاحاً يجب معالجتها. (2)			
I am unfamiliar with interventions to help smokers quit/لست على دراية بطرق مساعدة المدخنين على الإقلاع عن التدخين. (3)			
Patients are not motivated to quit/ لا يوجد دافع للمرضى للإقلاع عن التدخين. (4)			
Patients usually fail to quit/ عادة يفشل المرضى في الإقلاع عن التدخين. (5)			

End of Block: TPB Questionnaire

Start of Block: Knowledge

For each statement about smoking and quitting smoking, please indicate which response is correct, or if you don't know the answer/ يرجى لكل عبارة عن التدخين والإقلاع عن التدخين ، الإشارة إلى الإجابة الصحيحة ، أو إذا كنت لا تعرف الإجابة.

What percentage of smokers in Saudi Arabia say that they were planning or thinking about quitting smoking in the next 12 months /ما هي نسبة المدخنين في السعودية الذين يقولون إنهم يخططون أو يفكرون في الإقلاع عن التدخين في الـ 12 شهرًا المقبلة؟

(1) 23%
(2) 43%
(3) 63%
(4) 83%
(5) لا أعرف /I don't know

Cigarette smoking is causally linked to which of the following diseases/تدخين السجائر يسبب أي من الأمراض التالية؟ [Check all that apply/حدد كل ما ينطبق]

☐ سرطان الرئة (1/Lung cancer)

☐ سرطان البنكرياس (7/Pancreatic cancer)

☐ الربو (8/Asthma)

☐ مرض النفخة الرئوية المزمن (9/COPD)

☐ لا أعرف (2/I don't know)

In patients with asthma, smoking ***reduces*** which of the following/عند مرضى الربو، ▫▫▫▫ التدخين أي مما يلي؟

(1) الاستجابة للعلاج بالكورتيكوستيرويدات المستنشقة والجهازية/The response to treatment with inhaled and systemic corticosteroids
(11) خطر تفاقم الربو عند البالغين/The risk of asthma exacerbations in adults
(12) احتمالية الإصابة بالربو عند الرضع/الأطفال /The likelihood of developing asthma in infants/children
(13) احتمالية الإصابة بالربو الحاد عند الرضع/الأطفال /The likelihood of severe asthma in infants/children
(14) لا أعرف /I don't know

Pulse oximetry reading in smokers are almost always/تكون قراءة قياس نسبة الأكسجين عبر النبض عند المدخنين دائمًا تقريبًا
مرتفعة بشكل خاطئ (1/Falsely high
منخفضة بشكل خاطئ (15/Falsely low
دقيقة (16/Accurate
لا أعرف (14/I don't know

_____

To achieve maximal treatment effectiveness, tobacco dependence treatment should address/لتحقيق أقصى قدر من فعالية العلاج، يجب على علاج الاعتماد على التبغ أن يعالج
الجانب السلوكي للاعتماد على التبغ (15/The behavioral aspect of tobacco dependence
الجانب الفسيولوجي للاعتماد على التبغ (18/The physiological aspect of tobacco dependence
أحد جوانب الاعتماد على التبغ (19/Either aspect of tobacco dependence
كلا الجانبين من الاعتماد على التبغ (20/Both aspects of tobacco dependence
لا أعرف (14/I don't know

_____

أي مما يلي ⬚⬚⬚ من أعراض/Which of the following is **_NOT_** a nicotine withdrawal symptom انسحاب النيكوتين؟
القلق (15/Anxiety
الانفعال /الإحباط /الغضب (21/Irritability/frustration/anger
الأرق (22/Insomnia
قلة الشهية /فقدان الوزن (23/Decreased appetite/weight loss
لا أعرف (14/I don't know

_____

Compared to smokers who do not receive brief smoking cessation counseling from healthcare providers, those who do receive brief smoking cessation counseling are how many times as likely to quit smoking in the near future/مقارنة بالمدخنين الذين لا يتلقون مشورة موجزة بشأن الإقلاع عن التدخين من مقدمي الرعاية الصحية، ما هو احتمالية الإقلاع عن التدخين في المستقبل القريب للذين يتلقون مشورة موجزة بشأن الإقلاع عن التدخين؟
نصف احتمالية الذين لا يتلقون المشورة (1/ Half as likely
نفس احتمالية الذين لا يتلقون المشورة (2/ Equally likely
ضعف احتمالية الذين لا يتلقون المشورة (3/ Twice as likely
ثلاثة أضعاف احتمالية الذين لا يتلقون المشورة (4/ Three times as likely
لا أعرف (5/ I don't know
أفضل عدم الإجابة (6/Prefer not to answer

_____

Which of the following is **_NOT_** a part of the 5 A's/أجزاء الـ 5 من جزءًا ☐☐☐☐ ☐☐ يلي مما أي
التدخين؟ عن الإقلاع على المرضى لمساعدة الرئيسية

اسأل (3/Ask
انصح (7/Advise
نفذ (8/Act
ساعد (9/Assist
لا أعرف (5 /I don't know)

Varenicline, better known by the brand name Champix, should be taken for ____ days
prior to the quit date/لمدة _____ يومًا، شامبكس التجارية العلامة باسم المعروف الفارينكلين، تناول يجب
التدخين. عن الإقلاع تاريخ قبل

يوم واحد (1/1 day)
إلى 3 أيام (2)2 to 3 days/
إلى 6 أيام (3)4 to 6 days/
على الأقل 7 أيام (4 /At least 7 days)
لا أعرف (5 /I don't know)
أفضل عدم الإجابة (6 /Prefer not to answer)

Which dose of nicotine patch should a smoker use if she smokes 1 pack of cigarettes per
day/ ما هي جرعة لصقة النيكوتين التي يجب أن تستخدمها المدخنة إذا كانت تدخن علبة سجائر واحدة يوميًا؟

لصقة 7 مجم (1/7 mg patch)
لصقة 14 مجم (2 /14 mg patch)
لصقة 21 مجم (3 /21 mg patch)
لصقتان 21 مجم (4 /2, 21 mg patches)
لا أعرف (5 /I don't know)
أفضل عدم الإجابة (6/Prefer not to answer)

الرجاء وصف ما أعجبك في البرنامج /Please describe what you liked about the training program
التدريبي.

_____

الرجاء وصف ما لم يعجبك في Please describe what you did not like about the training program
البرنامج التدريبي.

_____

Please describe the barriers you faced to providing brief counseling to smokers /الرجاء وصف العوائق و الصعوبات التي واجهتها لتقديم مشورة موجزة للمدخنين.

_____

Overall, how satisfied were you with the training program/ بشكل عام، ما مدى رضاك عن البرنامج التدريبي؟

    Very satisfied/ (1) راضٍ جدًا

    Somewhat satisfied/ (4) راض إلى حد ما

    Neither satisfied nor dissatisfied/ (5) لا راض ولا غير راض

    Somewhat dissatisfied/ (6) مستاء بعض الشيء

    Very dissatisfied/ (7) مستاء جدا

Would you recommend the training program to your patients /هل تنصح بالبرنامج التدريبي لمرضاك؟

    Yes/(1) نعم

    No/لا. (Why not/لم لا؟) (4)

    _____

    (3): (please explain/الرجاء التوضيح) يعتمد على المريض/Depends on the patient

    _____

Would you recommend the training program to other healthcare providers /هل تنصح بالبرنامج التدريبي لمقدمي الرعاية الصحية الآخرين؟

    Yes/(1) نعم

    No/لا. (Why not/لم لا؟) (4)

    _____

    (3): (please explain/الرجاء التوضيح) ربما/Maybe

    _____

Are there changes that you would recommend to improve the training program/ هل هناك تغييرات تنصح بها لتحسين برنامج التدريب؟

    Yes/(1) نعم

    No/(4) لا

What changes would you recommend/ماهي التغييرات التي تنصح بها؟ (Please list below/الرجاء ذكرها أدناه)

    _____

End of Block: Satisfaction and Follow-up

One-month Post-Cessation Training

Thank you for taking the survey. This survey asks about your role in tobacco use and tobacco cessation. This important information will help researchers and policy makers understand the potential role of respiratory therapists in combatting tobacco use. The survey is composed of several sections and will take about 10 minutes to complete. All responses will be confidential and study results will only be reported in aggregate form/شكرًا لك على المشاركة في الاستبيان. يطرح هذا الاستبيان أسئلة عن دورك في استخدام التبغ والإقلاع عنه. ستساعد هذه المعلومات المهمة الباحثين وصناع القرار على فهم الدور المحتمل لأخصائيي العلاج التنفسي في مكافحة استخدام التبغ. يتكون الاستبيان من عدة أقسام ويستغرق إكماله حوالي 10 دقائق. ستكون جميع الردود سرية ولن يتم الإفادة عن نتائج الدراسة إلا في شكل إجمالي.

This Section asks questions about your intentions, experiences, and perspectives on helping your patients quit smoking cigarettes, waterpipe, and other tobacco products that are smoked as well as using electronic cigarettes/ يطرح هذا القسم أسئلة حول نواياك، تجاربك، و وجهات نظرك حول مساعدة مرضاك على الإقلاع عن تدخين السجائر و النرجيلة (الشيشة أو المعسل (و أنواع التبغ الأخرى التي تدخن، بالإضافة إلى السجائر الإلكترونية.

How often do you ask your patients about their smoking status during their admission period/ كم مرة تسأل جميع مرضاك عن حالة التدخين لديهم أثناء فترة دخولهم المستشفى؟

- أبدًا (0 %من الوقت)/(1) Never (0% of time)
- نادرًا (1-25 %من الوقت)/(2) Rarely (1-25% of the time)
- أحيانًا (26-50 %من الوقت)/(3) Occasionally (26-50% of the time)
- في أغلب الأحيان (51-99 %من الوقت)/(4) Most of the time (51 to 99% of the time)
- دائمًا (100%من الوقت)/(5) Always (100% of the time)

Among your patients who currently use any type of tobacco such as cigarettes, waterpipe, or electronic cigarettes, to what extent do you engage in the following behaviors to promote smoking cessation/ من بين مرضاك الذين يستخدمون أي نوع من أنواع التبغ كالسجائر و النرجيلة (الشيشة أو المعسل (و السجائر الإلكترونية حاليًا ، إلى أي مدى تشارك في السلوكيات التالية للتشجيع على الإقلاع عن التدخين؟

195

	Never (0% of time)/أبدًا (من 0% من الوقت) (1)	Rarely (1-25% of the time)/نادرًا (من 1-25% من الوقت) (2)	Occasionally (26-50% of the time)/أحيانًا (من 26-50% من الوقت) (3)	Most of the time (51 to 99% of the time)/في أغلب الأحيان (من 51-99% من الوقت) (4)	Always (100% of the time)/دائمًا (من 100% من الوقت) (5)
Assess patient willingness to quit/تقييم استعداد المريض للإقلاع عن التدخين. (1)					
Advise patients to stop smoking/نصح المرضى بالتوقف عن التدخين. (2)					
Refer patients who smoke to others for appropriate cessation treatment/إحالة المرضى الذين يدخنون إلى الآخرين لتلقي العلاج المناسب للإقلاع عن التدخين. (3)					
Recommend nicotine replacement therapy or other medications for smoking cessation/التوصية بالعلاج ببدائل النيكوتين أو الأدوية الأخرى للإقلاع عن التدخين. (4)					

Provide brochures/self-help materials/تقديم الكتيبات /مواد المساعدة الذاتية. (5)
Arrange follow-up visits with patient to address smoking/ترتيب زيارات المتابعة مع المريض لمعالجة التدخين. (6)
Monitor patient progress in attempting to quit/مراقبة تقدم المريض في محاولة الإقلاع عن التدخين. (7)
Access the patient's records to review their tobacco status/الوصول إلى السجلات الصحية للمريض لمراجعة حالة التدخين. (8)
Add data to the patient's record about tobacco or smoking cessation status or goals/إضافة بيانات إلى السجل الصحي للمريض حول حالة أو أهداف الإقلاع عن التدخين أو استخدام التبغ. (9)

End of Block: TPB Questionnaire

The Next sections ask about tobacco products use. There are specific questions for cigarettes, waterpipe, and electronic cigarettes/الأقسام القادمة تقدم أسئلة عن استخدام منتجات التبغ. يوجد أسئلة محددة لكلٍ من السجائر، النرجيلة)الشيشة أو المعسل(، والسجائر الإلكترونية.

Do you currently use any of the following tobacco products on daily or less than daily basis _____هل تقوم حالياً باستخدام أي من منتجات التبغ التالية بشكل يومي أو أقل من يومي? [check all that applies /حدد كل ما ينطبق]

☐   السجائر (1/Cigarettes

☐   النرجيلة)الشيشة أو المعسل (مع التبغ((4/ Waterpipe with tobacco

☐   السجائر الإلكترونية (5/ Electronic cigarettes

☐   لا أستخدم أي من هذه المنتجات على الإطلاق (6/ Not at all

☐   لا أعرف (7 /Don't know

☐   أفضل عدم الإجابة (8/Prefer not to answer

During the past 30 days, have you tried to stop using any of the tobacco products you are using even for 1 day/خلال الشهر الماضي، هل حاولت الإقلاع عن استخدام أي من منتجات التبغ التي تستخدمها ولو ليوم واحد؟

    نعم (1/Yes
    لا (2/No
    أفضل عدم الإجابة (3/Prefer not to answer

Appendix E. Educational Training Program Materials (Intervention)

Rx for CHANGE

Tobacco Cessation in Respiratory Care

TRAINING OVERVIEW

- Epidemiology of Tobacco Use
- Impact of Tobacco Use on Respiratory Health
- Nicotine Pharmacology & Addiction
- Assisting Patients with Quitting
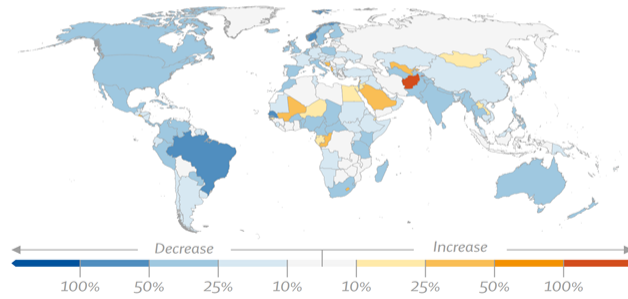- Medications for Smoking Cessation

EPIDEMIOLOGY of TOBACCO USE

Global Trends of Smoking Between 1990-2019
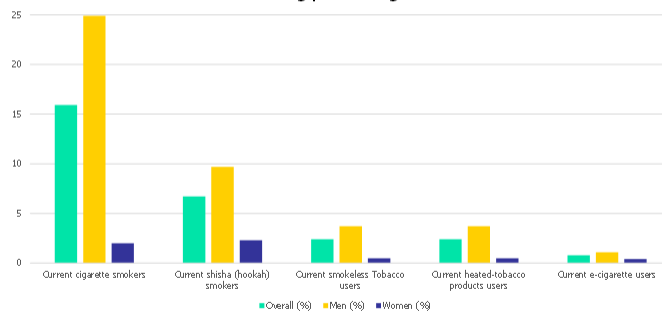
Change in prevalence by country, 1990–2019

Decrease — Increase

100% 50% 25% 10% | 10% 25% 50% 100%

Spatial, temporal, and demographic patterns in prevalence of smoking tobacco use and attributable disease burden in 204 countries and territories, 1990–2019: a systematic analysis from the Global Burden of Disease Study 2019. The Lancet 2021; published online May 27

Prevalence of tobacco use, by Sex—Saudi Arabia 2019

Current tobacco use among persons aged 15 or older

Current cigarette smokers | Current shisha (hookah) smokers | Current smokeless Tobacco users | Current heated-tobacco products users | Current e-cigarette users
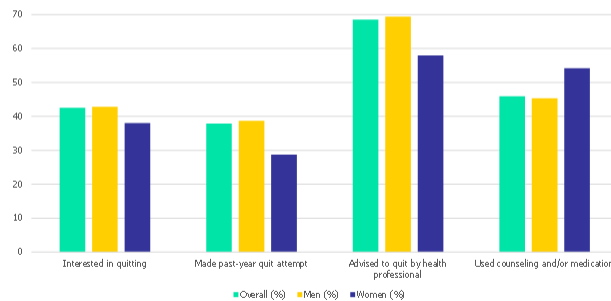
■ Overall (%) ■ Men (%) ■ Women (%)

Source: Global Adult Tobacco Survey - 2019

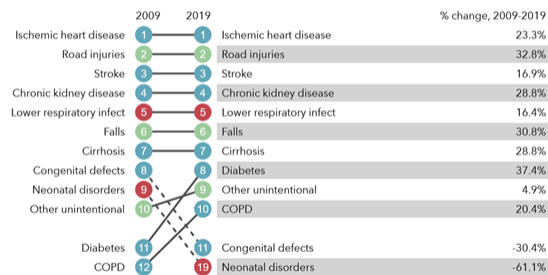# Epidemiology of Quitting Tobacco in Saudi Arabia 2019

Current tobacco use among persons aged 15 or older

Source: Global Adult Tobacco Survey - 2019

WHAT CAUSES THE MOST DEATHS in SAUDI ARABIA?

	2009	2019		% change, 2009-2019
Ischemic heart disease	1	1	Ischemic heart disease	23.3%
Road injuries	2	2	Road injuries	32.8%
Stroke	3	3	Stroke	16.9%
Chronic kidney disease	4	4	Chronic kidney disease	28.8%
Lower respiratory infect	5	5	Lower respiratory infect	16.4%
Falls	6	6	Falls	30.8%
Cirrhosis	7	7	Cirrhosis	28.8%
Congenital defects	8	8	Diabetes	37.4%
Neonatal disorders	9	9	Other unintentional	4.9%
Other unintentional	10	10	COPD	20.4%
Diabetes	11	11	Congenital defects	-30.4%
COPD	12	19	Neonatal disorders	-61.1%

Mortality attributable to tobacco use was estimated to account for 280, 000 premature deaths (1996-2012)

https://www.healthdata.org/saudi-arabia

HEALTH CONSEQUENCES OF SMOKING

MAJOR DISEASE-RELATED CONCLUSIONS:

- Cigarette smoking is causally linked to diseases of nearly all organs of the body, diminished health status, and harm to the fetus.
  - Additionally, smoking has many adverse effects on the body, such as causing inflammation and impairing immune function.

- Exposure to second-hand smoke is causally linked to cancer, respiratory, and cardiovascular diseases, and to adverse effects on the health of infants and children.

- Disease risks from smoking by women have risen over the last 50 years and for many tobacco-related diseases are now equal to those for men.

U.S. Department of Health and Human Services (USDHHS). (2014). *The Health Consequences of Smoking—50 Years of Progress: A Report of the Surgeon General.*

HEALTH CONSEQUENCES of SMOKING

- Cancers
  - Bladder/kidney/ureter
  - Blood (acute myeloid leukemia)
  - Cervix
  - Colon/rectum
  - Esophagus/stomach
  - Liver
  - Lung
  - Oropharynx/larynx
  - Pancreatic
- Pulmonary diseases
  - Asthma
  - COPD
  - Pneumonia/tuberculosis
  - Chronic respiratory symptoms

- Cardiovascular diseases
  - Aortic aneurysm
  - Coronary heart disease
  - Cerebrovascular disease
  - Peripheral vascular disease
- Reproductive effects
  - Reduced fertility in women
  - Poor pregnancy outcomes (e.g., congenital defects, low birth weight, preterm delivery)
  - Infant mortality
- Other: cataract, diabetes (type 2), erectile dysfunction, impaired immune function, osteoporosis, periodontitis, postoperative complications, rheumatoid arthritis

U.S. Department of Health and Human Services (USDHHS). (2014).
The Health Consequences of Smoking—50 Years of Progress: A Report of the Surgeon General.

COMPOUNDS IN TOBACCO SMOKE

An estimated 4,800 compounds in tobacco smoke,
including 16 proven human carcinogens

Gases	Particles
Carbon monoxide	Nicotine
Hydrogen cyanide	Nitrosamines
Ammonia	Lead
Benzene	Cadmium
Formaldehyde	Polonium-210

Nicotine is the addictive component of tobacco products, but it does NOT cause the ill health effects of tobacco use.

ELECTRONIC CIGARETTES ("e-cigarettes")

- Battery-operated devices
  - Known to contain nicotine (0–36 mg/ml), flavoring (e.g., tobacco, fruit, chocolate, mint, cola), propylene glycol, and glycerin
  - Battery warms cartridge; user inhales nicotine vapor or "smoke"
  - Heating element vaporizes liquid at temperatures of 65–120°C

- Not labeled with health warnings

E-pipe   E-cigar

Disposable e-cigarette

Rechargeable e-cigarette

Large-size tank devices

Medium-size tank devices
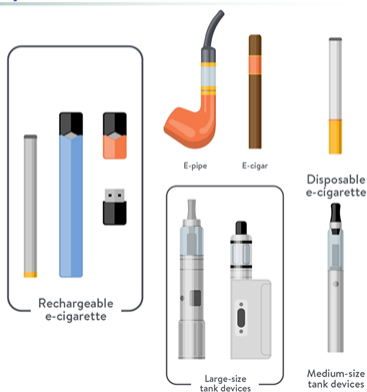
ELECTRONIC CIGARETTES:
Potential Health Risks

- Nicotine is highly addictive and can be harmful.
  - Refill cartridges with high concentrations of nicotine are a poisoning risk, especially in children.
- Propylene glycol may cause respiratory irritation and increase the risk for asthma.
- Glycerin may cause lipoid pneumonia on inhalation.
- Carcinogenic substances are found in some aerosols.
- Use of e-cigarettes leads to emission of propylene glycol, particles, nicotine, and carcinogens into indoor air.
  - Long-term safety of second-hand exposure to e-cigarette aerosols is unknown.

ELECTRONIC CIGARETTES:
Current Trends and Evidence

- Can reduce the desire (craving) to smoke cigarettes and alleviate nicotine withdrawal symptoms
- Some smokers reduce the number of cigarettes smoked or quit smoking as a result of using e-cigarettes
- Have not been proven effective as an aid for sustained smoking cessation
- Concern about "gateway" to tobacco use in adolescents

Long-term safety and cessation efficacy data are lacking.

INVOLUNTARY EXPOSURE to TOBACCO SMOKE

- Second-hand smoke causes premature death and disease in nonsmokers (children and adults).
- Children:
  - Increased risk for sudden infant death syndrome (SIDS), acute respiratory infections, ear problems, and more severe asthma
  - Respiratory symptoms and slowed lung growth if parents smoke
- Adults:
  - Immediate adverse effects on cardiovascular system
  - Increased risk for coronary heart disease and lung cancer
- Indoor spaces: eliminating smoking fully protects nonsmokers; separating smoking areas, cleaning the air, and ventilation are ineffective.

There is no safe level of second-hand smoke.

U.S. Department of Health and Human Services (USDHHS). (2006).
The Health Consequences of Involuntary Exposure to Tobacco Smoke: Report of the Surgeon General.

EPIDEMIOLOGY of TOBACCO USE: SUMMARY

- Fewer than one in five people aged 15 or older in Saudi Arabia are current smokers; smoking prevalence varies by sociodemographic characteristics.
- Globally in 2019, smoking tobacco use accounted for 7·69 million deaths and 200 million disability-adjusted life-years.
- For the individual, smoking a pack-a-day costs SAR 8,760 annually, plus associated health-care costs.
- At any age, there are benefits to quitting smoking.
- The biggest opponent to tobacco control efforts is the tobacco industry.

Rx for CHANGE
Tobacco Cessation in Respiratory Care

IMPACT of TOBACCO USE on RESPIRATORY HEALTH

SMOKING and RESPIRATORY DISEASE

- Acute respiratory diseases: increased risk, duration, severity
  - Upper respiratory tract
    - Rhinitis, laryngitis, pharyngitis, sinusitis
  - Lower respiratory tract
    - Bronchitis, pneumonia
- Chronic respiratory diseases
  - Asthma
  - Chronic obstructive pulmonary disease (COPD)
  - Tuberculosis
  - Lung cancer

PNEUMONIA

- Smokers exhibit increased risk for pneumonia

- Biologic mechanisms:
  - Damages cilia
  - Increases permeability of airway epithelium
    - Enables infection to more easily enter lungs
  - Reduces overall immune response

- Risk increases as number of cigarettes smoked increases

- Risk returns to baseline after ten years of not smoking

ASTHMA

- An estimated 23.2% of the Saudi population with asthma are ever daily smokers in 2019

- Smoking increases the risk of asthma exacerbations in adults

- Reduced response to treatment with inhaled and systemic corticosteroids

Patients with asthma should not smoke.

ASTHMA: IN UTERO EXPOSURE

- Maternal smoking results in infant/child:
  - 1.8 times increased likelihood of developing asthma as well as lifetime history of wheezing
  - 3.6 times increased likelihood of severe asthma
  - Deficits in lung function up to age 6
    - Reduction in forced expiratory flow and suppression of child's:
      - formation of the alveoli
      - functional residual capacity
      - tidal flow volume

CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD)

- Characterized by airflow limitation (not fully reversible)
- Progressive airflow limitation associated with abnormal inflammatory lung response to noxious particles or gases
- Characteristic symptoms: cough, sputum production, dyspnea
- Prevalence and incidence of COPD in Saudi Arabia have been steadily rising (1990-2019). This was higher in males than females.
- In 2019, COPD deaths accounted for 57% of all deaths caused by chronic respiratory diseases.
- 10th leading cause of death in Saudi Arabia

The primary risk factor for COPD is tobacco smoking.

Alqahtani JS. PLoS One. (2022);17(5):e0268772.

206

COPD: BIOLOGIC MECHANISMS

Tobacco smoke induces inflammation and damage to pulmonary tissue through

- Release of inflammatory cells and mediators
- Imbalance between proteases and antiproteases
- Oxidative stress

The best treatment for COPD is to quit smoking.
Medications simply manage the symptoms.

TUBERCULOSIS

- In Saudi Arabia, total number of new and relapsed TB cases was 3,004 cases, with an incidence of 8.7 per 100,000 (2019)
- Smoking is a causal risk factor for contracting TB
  - 2.0–2.6 increased risk compared to nonsmokers
- Risk increases with
  - Number of cigarettes smoked
  - Duration of smoking
- Exposure to second-hand smoke increases risk for TB in children
- Smoking is causally associated with recurrent TB and TB-related mortality

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SMOKING and LUNG CANCER

- Lung cancer accounts for an estimated 16.3% of cancer cases in GCC member countries (2018)
- Smoking cessation yields meaningful improvements in all forms of cancer treatment (surgery, chemotherapy, radiation)
- Early-stage non-small-cell lung cancer:
  - 5-year survival rates are up to 70% in those who quit, versus 33% in those who do not
  - Patients who continue to smoke are nearly 2X as likely to have a recurrence and more than 4X as likely to develop a second primary tumor

SMOKING and LUNG CANCER (cont'd)

- Despite the benefits of quitting, a survey results of the International Association for the Study of Lung Cancer members found
    - 39% of lung cancer physicians actively provide cessation assistance to their patients

EFFECT of SECOND-HAND SMOKE on CYSTIC FIBROSIS PATIENTS

- For every 10 cigarettes/day smoked in household:
    - FEV1 decreased by 4%
    - FVC decreased by 3%
- Increase in coughing and severity of respiratory illnesses
- Fivefold increase in pulmonary-related hospitalizations

THIRD-HAND SMOKE

- The residual chemicals from smoking that deposit on clothing, hair, skin, and other surfaces
    - Contains more than 250 harmful chemicals; can last for days or weeks
    - Can cause respiratory irritation and is particularly dangerous to infants
- While most adults know that second-hand smoke is harmful, few know about third-hand smoke

SMOKING and POSTOPERATIVE COMPLICATIONS

- Respiratory complications
  - Pneumonia
  - Respiratory failure
- Surgical wound complications
  - Delayed healing
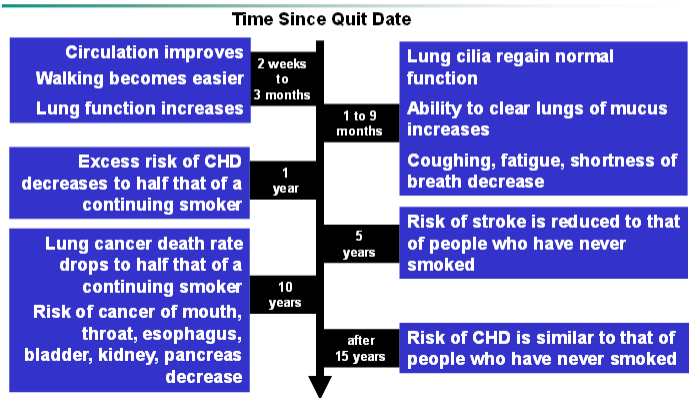 - Wound dehiscence
  - Infection
  - Scarring

CARBON MONOXIDE (CO): PULSE OXIMETRY

- The CO from tobacco smoke binds to hemoglobin, taking the place of oxygen

- Oximeters cannot differentiate between hemoglobin molecules that are saturated in oxygen versus those carrying CO
  - Readings will be higher
  - Effects last for up to 4 hours after smoking a cigarette

- Arterial blood gas assessment is more accurate for determining oxygen saturation in patients who smoke

QUITTING: HEALTH BENEFITS

Time Since Quit Date

	Time	
Circulation improves, Walking becomes easier, Lung function increases	2 weeks to 3 months	
	1 to 9 months	Lung cilia regain normal function; Ability to clear lungs of mucus increases; Coughing, fatigue, shortness of breath decrease
Excess risk of CHD decreases to half that of a continuing smoker	1 year	
	5 years	Risk of stroke is reduced to that of people who have never smoked
Lung cancer death rate drops to half that of a continuing smoker; Risk of cancer of mouth, throat, esophagus, bladder, kidney, pancreas decrease	10 years	
	after 15 years	Risk of CHD is similar to that of people who have never smoked

BENEFICIAL EFFECTS of QUITTING: PULMONARY EFFECTS

AT ANY AGE, there are pulmonary benefits of quitting.
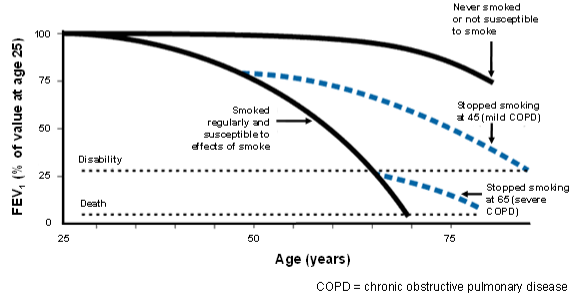
Reprinted with permission. Fletcher & Peto. (1977). *BMJ* 1(6077):1645–1648.
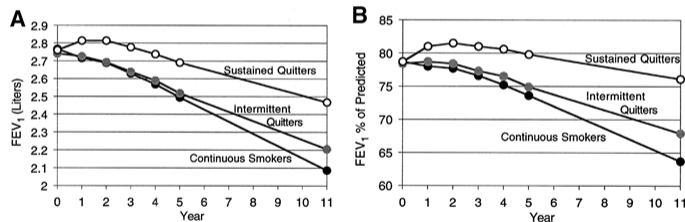
Anthonisen NR, Connett JE, Murray RP. Am J Respir Crit Care Med. (2002);166(5):675-9

IMPACT of TOBACCO USE: SUMMARY

- Exposure to tobacco smoke significantly compromises pulmonary health

  - Acute and chronic disease rates are elevated in persons of all ages who are exposed to tobacco smoke

- There is no safe level of exposure to second-hand smoke, and third-hand smoke can be harmful to patients with respiratory disorders

- Quitting smoking can improve, reverse, or halt the progression of many tobacco-related respiratory diseases and improve surgical outcomes

210

Rx for CHANGE
Tobacco Cessation in Respiratory Care

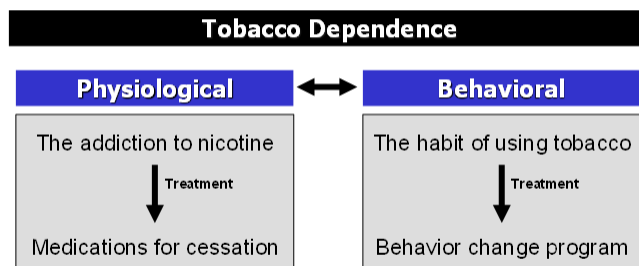## NICOTINE PHARMACOLOGY and PRINCIPLES of ADDICTION

WHAT IS ADDICTION?

"Compulsive drug use, without medical purpose, in the face of negative consequences"

Alan I. Leshner, Ph.D.
Former director, National Institute on Drug Abuse
National Institutes of Health

**Nicotine addiction is a chronic condition with a biological basis.**

TOBACCO DEPENDENCE: A 2-PART PROBLEM

Tobacco Dependence

Physiological	Behavioral
The addiction to nicotine	The habit of using tobacco
↓ Treatment	↓ Treatment
Medications for cessation	Behavior change program

Treatment should address the physiological **and** behavioral aspects of dependence.
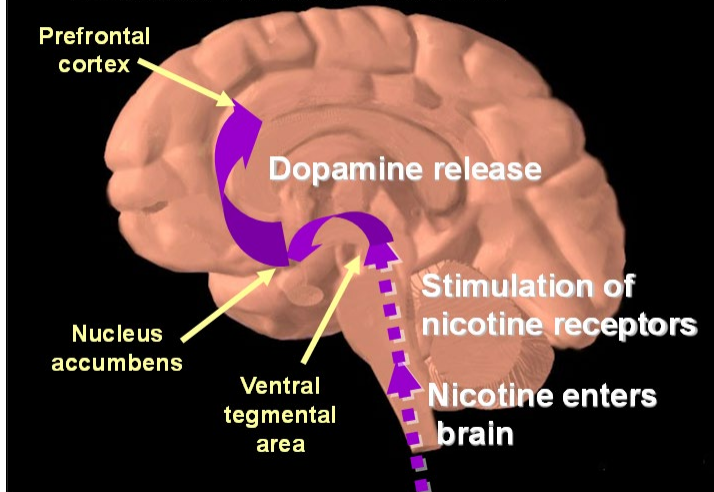
NICOTINE DISTRIBUTION
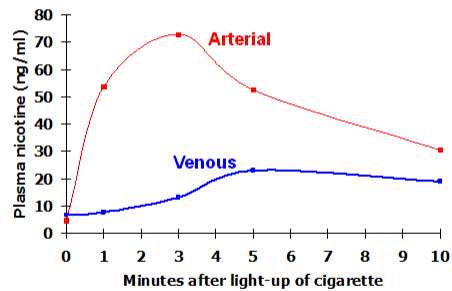
Nicotine reaches the brain within 10–20 seconds.

Henningfield et al. (1993). *Drug Alcohol Depend* 33:23–29.

DOPAMINE REWARD PATHWAY

Prefrontal cortex

Dopamine release

Nucleus accumbens

Ventral tegmental area

Stimulation of nicotine receptors

Nicotine enters brain

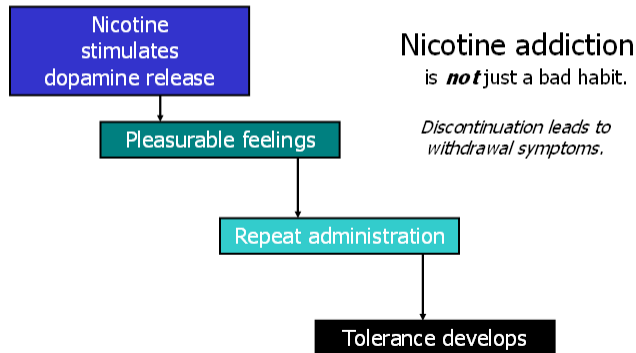## NICOTINE PHARMACODYNAMICS: WITHDRAWAL EFFECTS

- Irritability/frustration/anger
- Anxiety
- Difficulty concentrating
- Restlessness/impatience
- Depressed mood/depression
- Insomnia
- Impaired performance
- Increased appetite/weight gain
- Cravings

Most symptoms manifest within the first 1–2 days, peak within the first week, and subside within 2–4 weeks.

Hughes. (2007). *Nicotine Tob Res* 9:315–327.

BIOLOGY of NICOTINE ADDICTION: ROLE of DOPAMINE

Nicotine stimulates dopamine release

→ Pleasurable feelings

→ Repeat administration

→ Tolerance develops

Nicotine addiction is *not* just a bad habit.

Discontinuation leads to withdrawal symptoms.

Benowitz. (2008). *Clin Pharmacol Ther* 83:531–541.

NICOTINE ADDICTION

- Tobacco users maintain a minimum serum nicotine concentration in order to
  - Prevent withdrawal symptoms
  - Maintain pleasure/arousal
  - Modulate mood

- Users self-titrate nicotine intake by
  - Smoking/dipping more frequently
  - Smoking more intensely
  - Obstructing vents on low-nicotine brand cigarettes

Benowitz. (2008). *Clin Pharmacol Ther* 83:531–541.

213

FACTORS CONTRIBUTING to TOBACCO USE

Individual
- Sociodemographics
- Genetic predisposition
- Coexisting medical conditions

Tobacco Use

Pharmacology
- Alleviation of withdrawal symptoms
- Weight control
- Pleasure, mood modulation

Environment
- Tobacco advertising
- Conditioned stimuli
- Social interactions

NICOTINE PHARMACOLOGY and ADDICTION: SUMMARY

- Tobacco products are effective delivery systems for the drug nicotine.

- Nicotine is a highly addictive drug that induces a constellation of pharmacologic effects, including activation of the dopamine reward pathway in the brain.

- Tobacco use is complex, involving the interplay of a wide range of factors.

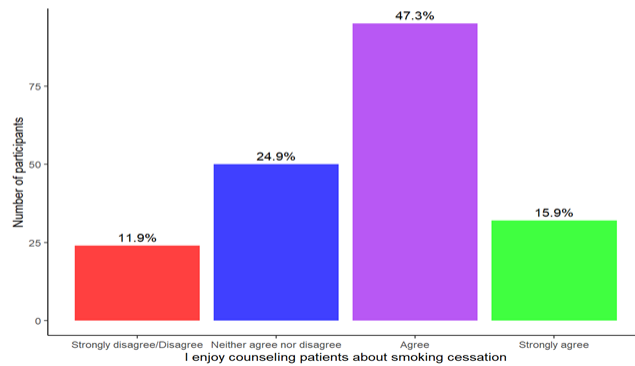- Treatment of tobacco use and dependence requires a multifaceted treatment approach.

214

Rx for CHANGE
Tobacco Cessation in Respiratory Care
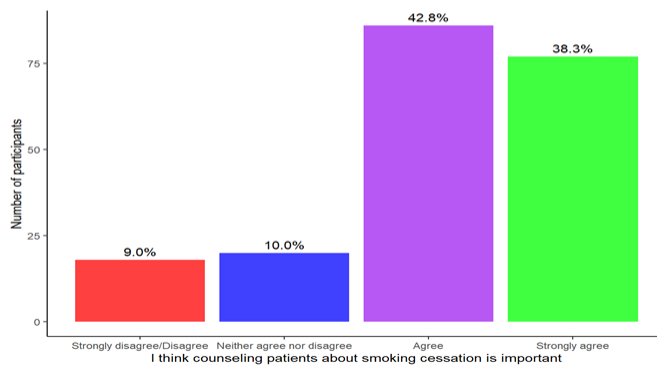
ASSISTING PATIENTS
with QUITTING

RTs in Saudi Arabia: Attitudes
Towards Cessation Counseling

Number of participants

11.9%   24.9%   47.3%   15.9%

Strongly disagree/Disagree   Neither agree nor disagree   Agree   Strongly agree
I enjoy counseling patients about smoking cessation

Results of Survey of Respiratory Therapists in Saudi Arabia, 2022

RTs in Saudi Arabia: Attitudes
Towards Cessation Counseling

Number of participants

9.0%   10.0%   42.8%   38.3%

Strongly disagree/Disagree   Neither agree nor disagree   Agree   Strongly agree
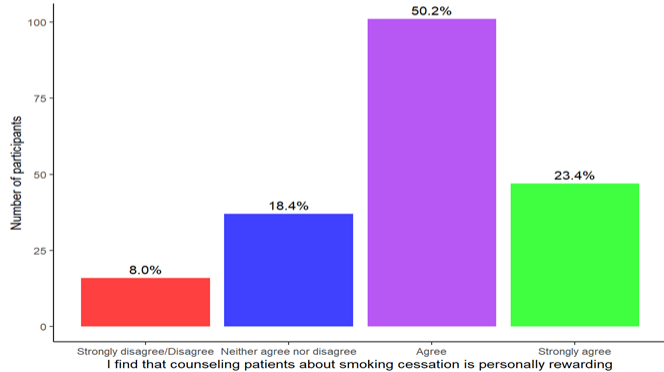I think counseling patients about smoking cessation is important

Results of Survey of Respiratory Therapists in Saudi Arabia, 2022

215

Attitudes of Saudi RTs Towards Cessation Counseling
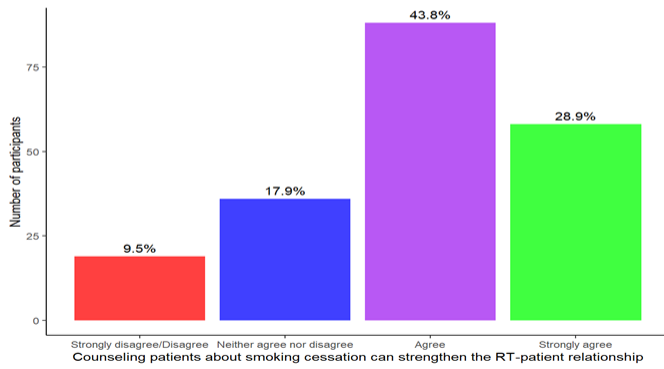
Counseling patients about smoking cessation can strengthen the RT-patient relationship

- Strongly disagree/Disagree: 9.5%
- Neither agree nor disagree: 17.9%
- Agree: 43.8%
- Strongly agree: 28.9%

Results of Survey of Respiratory Therapists in Saudi Arabia, 2022

RTs in Saudi Arabia: Attitudes Towards Cessation Counseling

I find that counseling patients about smoking cessation is personally rewarding

- Strongly disagree/Disagree: 8.0%
- Neither agree nor disagree: 18.4%
- Agree: 50.2%
- Strongly agree: 23.4%

Results of Survey of Respiratory Therapists in Saudi Arabia, 2022

RTs in Saudi Arabia: Attitudes Towards Cessation Counseling

I feel a duty to counsel smokers to quit

- Strongly disagree/Disagree: 9.1%
- Neither agree nor disagree: 31.8%
- Agree: 40.9%
- Strongly agree: 18.2%

Results of Survey of Respiratory Therapists in Saudi Arabia, 2022

216
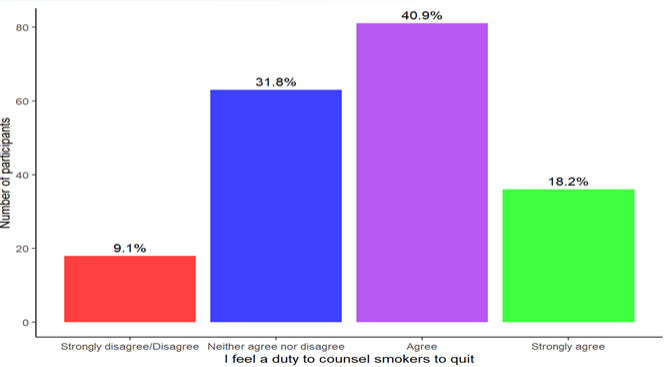
WHY BOTHER?

- <u>Single-most effective strategy</u> to lengthen and improve patients' lives.
- Quitting tobacco has immediate and long-term benefits for all patients.
- It is <u>inconsistent</u> to provide health care and, at the same time, remain silent (or inactive) about a major health risk.

**TOBACCO CESSATION
is an important component of PATIENT CARE.**

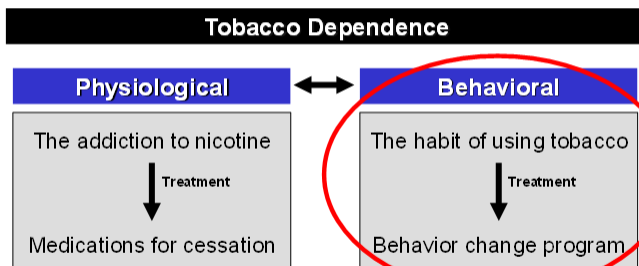## WHY SHOULD CLINICIANS ADDRESS TOBACCO?

- Tobacco users expect to be encouraged to quit by health professionals.
- Screening for tobacco use and providing tobacco cessation counseling are positively associated with patient satisfaction (Barzilai et al., 2001; Conroy et al., 2005).

Failure to address tobacco use tacitly implies that quitting is not important.

Barzilai et al. (2001). *Prev Med* 33:595–599; Conroy et al. (2005). *Nicotine Tob Res* 7 Suppl 1:S29–S34.

TOBACCO DEPENDENCE: A 2-PART PROBLEM

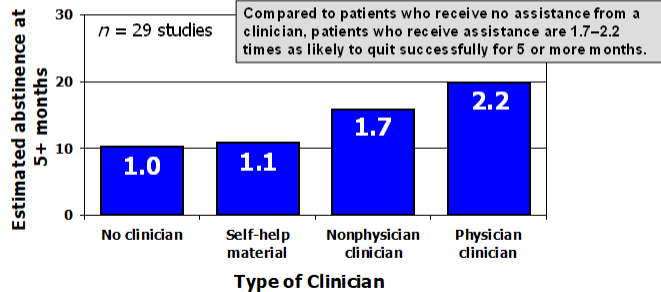| Tobacco Dependence	
Physiological ↔	**Behavioral**
The addiction to nicotine	The habit of using tobacco
↓ Treatment	↓ Treatment
Medications for cessation	Behavior change program

Treatment should address the physiological *and* the behavioral aspects of dependence.
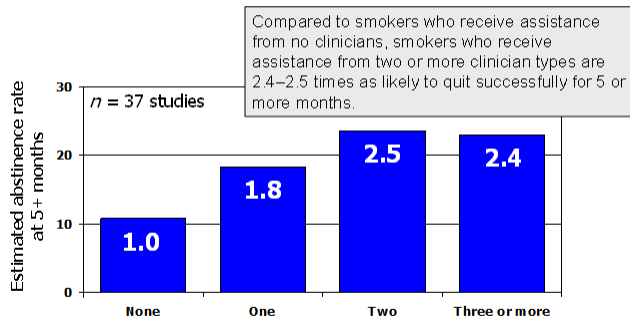
EFFECTS of CLINICIAN INTERVENTIONS

With help from a clinician, the odds of quitting approximately double.

Estimated abstinence at 5+ months

n = 29 studies

Compared to patients who receive no assistance from a clinician, patients who receive assistance are 1.7–2.2 times as likely to quit successfully for 5 or more months.

No clinician	Self-help material	Nonphysician clinician	Physician clinician
1.0	1.1	1.7	2.2

Type of Clinician

Fiore et al. (2008). *Treating Tobacco Use and Dependence: 2008 Update. Clinical Practice Guideline.* Rockville, MD: USDHHS, PHS.
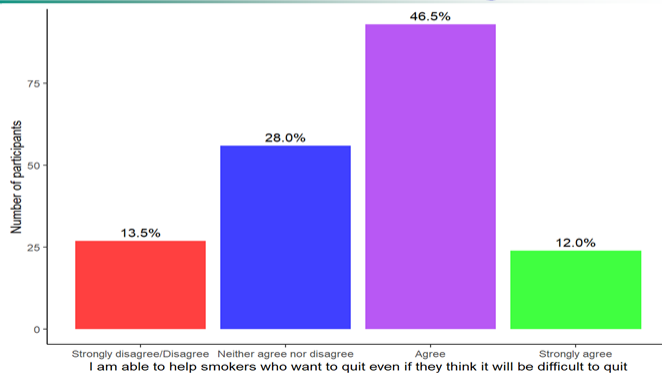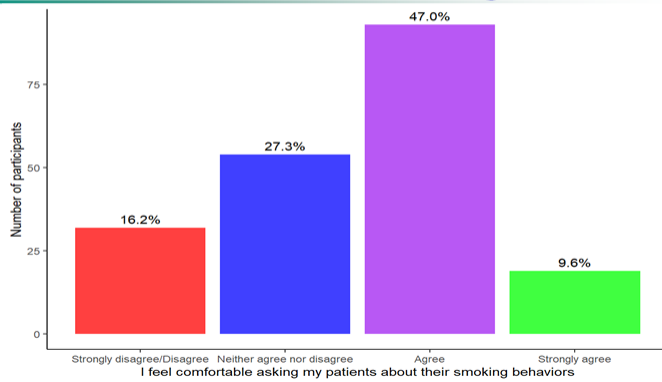

The NUMBER of CLINICIAN TYPES CAN MAKE a DIFFERENCE, TOO

Compared to smokers who receive assistance from no clinicians, smokers who receive assistance from two or more clinician types are 2.4–2.5 times as likely to quit successfully for 5 or more months.

Estimated abstinence rate at 5+ months

n = 37 studies

None	One	Two	Three or more
1.0	1.8	2.5	2.4

Fiore et al. (2008). *Treating Tobacco Use and Dependence: 2008 Update. Clinical Practice Guideline.* Rockville, MD: USDHHS, PHS.

RTs in Saudi Arabia: Confidence in Counseling

Number of participants

Strongly disagree/Disagree	Neither agree nor disagree	Agree	Strongly agree
13.5%	28.0%	46.5%	12.0%

I am able to help smokers who want to quit even if they think it will be difficult to quit

Results of Survey of Respiratory Therapists in Saudi Arabia, 2022

218

RTs in Saudi Arabia: Confidence in Counseling

47.0%

27.3%

16.2%

9.6%

Number of participants

75

50

25

0

Strongly disagree/Disagree   Neither agree nor disagree   Agree   Strongly agree

I feel comfortable asking my patients about their smoking behaviors

Results of Survey of Respiratory Therapists in Saudi Arabia, 2022

WHY RESPIRATORY THERAPISTS?

- Long-term relationships with many patients
  - Engender a sense of trust
  - Patients listen to what you have to say
- Patients look to you for expert advice on issues concerning the lungs
- Cessation can be discussed during the course of breathing treatments, etc.

You might be the ONE person who a patient listens to about smoking.

TOBACCO CESSATION REQUIRES BEHAVIOR CHANGE

- Fewer than 5% of people who quit without assistance are successful in quitting for more than a year
- Few patients adequately PREPARE and PLAN for their quit attempt
- Many patients do not understand the need to change behavior
- Patients think they can just "make themselves quit"

Behavioral counseling is a key component of treatment for tobacco use and dependence.

219

BEHAVIOR CHANGE (cont'd)

- Often, patients automatically smoke in the following situations:
    - When drinking coffee
    - While driving in the car
    - When bored
    - While stressed
    - While with specific friends or family members who use tobacco
    - After meals
    - During breaks at work
    - While on the telephone
- Behavioral counseling helps patients learn to cope with these difficult situations without having a cigarette.
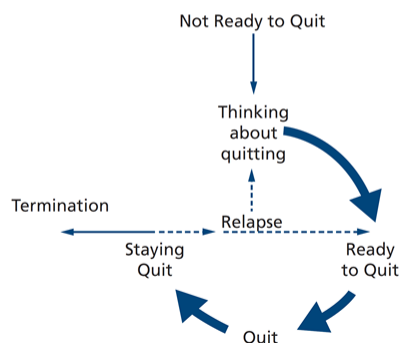
BEHAVIOR CHANGE (cont'd)

- Chronic nature of drug addiction

- Addiction can be managed successfully
    - it is common for addicted to occasionally relapse
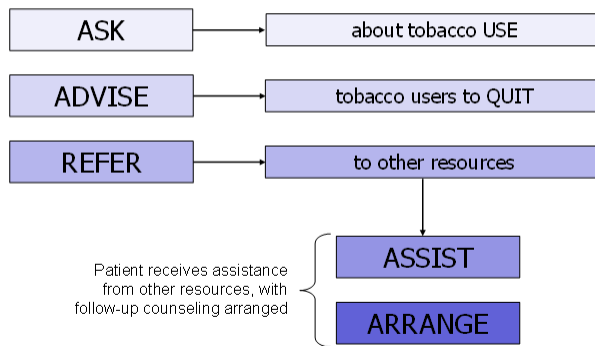
BEHAVIOR CHANGE (cont'd)

Not Ready to Quit

Thinking about quitting

Termination

Relapse

Staying Quit

Ready to Quit

Quit

AARC's Clinician's Guide to Treating Tobacco Dependence, 2014

220

The 5 A's

ASK	about tobacco USE
ADVISE	tobacco users to QUIT
ASSESS	READINESS to make a quit attempt
ASSIST	with the QUIT ATTEMPT
ARRANGE	FOLLOW-UP care

BRIEF COUNSELING: ASK, ADVISE, REFER

ASK	about tobacco USE
ADVISE	tobacco users to QUIT
REFER	to other resources

Patient receives assistance from other resources, with follow-up counseling arranged

ASSIST

ARRANGE
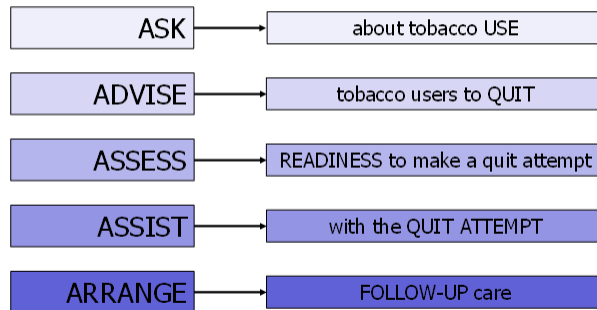
STEP 1: ASK

ASK about tobacco use

- "If it's OK with you, it would be helpful if we could talk about your tobacco use."
- "Do you, or does anyone in your household, ever smoke or use other types of tobacco or nicotine, such as e-cigarettes?"
  - "We ask our patients about tobacco use, because it contributes to many medical conditions."
  - "I take time to ask all of my patients about tobacco use—because it's important."

221

STEP 2: ADVISE

ADVISE tobacco users to quit (clear, strong, personalized)

- "It's important that you quit as soon as possible, and I can help you."

- "Cutting down while you are ill is not enough."

- "Occasional or light smoking is still harmful."

- "I realize that quitting is difficult. It is the most important thing you can do to protect your health now and in the future. I have training to help my patients quit, and when you are ready, I will work with you to design a specialized treatment plan."

NOT READY TO QUIT: COUNSELING STRATEGIES

Consider asking:

"Do you **ever** plan to quit?" ———→ **If NO** → Advise patients to quit, and offer to assist (if or when they change their mind).

If YES ↓

"What might be some of the benefits of quitting now, instead of later?"

| Most patients will agree: There is no "good" time to quit, and there are benefits to quitting sooner as opposed to later. |

↓

"What would have to change for you to decide to quit sooner?"

Responses will reveal some of the barriers to quitting.

ADVISING PARENTS/CAREGIVERS

- "Smoking outside, in the doorway, or in a separate room is not enough. The smoke clings to your hair, clothes, and skin, and can irritate your child's lungs and impair breathing."

- "Quitting is the best thing you can do for your long-term health <u>and</u> that of your child."

COUNSELING PARENTS WHO SMOKE

- Explain connection between smoking and child's illness in clear, matter-of-fact manner

- Refer interested parents to the quitline or other cessation programs

- For those not interested in quitting, offer suggestions to protect the child

- Discuss progress at follow-up visits

COUNSELING PARENTS (cont'd)

- Explain the connection:
  - "Your child has impaired lung function due to____. Exposing him/her to second- or third-hand smoke causes additional problems."
  - "Smoking outside or by the doorway is not sufficient, because the smoke clings to clothes/hair."
  - "For your child, the only safe amount of exposure to smoke is none."

COUNSELING PARENTS WHO ARE NOT INTERESTED IN QUITTING

- Do not smoke in the car or in front of your child
  - Children who see parents smoke are more likely to smoke
- Wear a "smoking jacket" and remove it when entering the home
  - Only removing exposed clothing and washing exposed skin/hair reduces risk
- When handling infants:
  - Remove all clothing worn while smoking
  - Wash hands/hair first

ADDITIONAL RECOMMENDATIONS

- Explaining the link between smoking and symptoms is important, because most parents underestimate
  - The amount of exposure
  - The harm of exposure

- Determine and modify exposure by other caregivers

- Refer to cessation programs
  - Most parents are willing to modify exposure to some extent

FOLLOW-UP

- For those patients seen multiple times:
  - Inform parents that you will be asking about their smoking behavior at each visit
  - Offer support and encouragement
  - Praise any change
  - Strategize solutions to challenges, as appropriate

Five Tips for engaging patients in behavior change:

1. Open-ended questions

Patients tell their stories and do most of the talking.

Less of these…	More of these…
"Have you made a quit attempt?"	"What makes you think it might be time to quit?"
"Do you want to quit smoking in the next 6 months?"	"What makes you interested in quitting at this time?

2. Reflective listening

Providers carefully listen and then paraphrase the patient's comments back.

Less of these…	More of these…
"Okay."	"It sounds like you're concerned about gaining weight if you quit smoking."
"Mhm…."	"I heard you say that you're concerned about withdrawal symptoms from quitting."

3. Self-motivational statements

Patients state reasons for change that are personally important to them

Less of these…	More of these…
"You would save a lot of money if you quit smoking."	"What would be different if you quit smoking?"
"Quitting smoking is the best thing you could do for your health."	"If you were to decide to quit, what would you have to do to make that happen?"

4. Affirmations

Practitioners communicate that they recognize strengths, successes, and efforts to change.

| Less of these...	More of these...
"You have tried to quit 5 times in the past?"	"You showed a lot of determination in doing that."
"You've already tried NRT and counseling?"	"I can tell that quitting is important to you."

5. Summary statements

Summaries are a good way to communicate that a provider is listening.

Less of these...	More of these...
"I understand."	"So far, I've heard you say that you want to quit smoking to improve your health, to save money, and to improve your relationship with your children."
"Okay."	"It sounds like your concerns about quitting are the withdrawal symptoms and having a partner who smokes."

Barriers and Responses

Barrier	Responses
Stress	"It sounds like you're experiencing a lot stress right now. I often hear that smoking helps people cope with stress. Can you tell me about how smoking helps you?"
Nothing works	"I can tell that quitting is important to you. Can you tell me more about your past quit attempts?"
Weight gain	"You're concerned about gaining weight. I hear that frequently. Can you tell me more about that?"
Not ready	"If you were to decide to quit, what would you have to do to make that happen?"
Desire to quit on own	"I'm glad to hear that you are interested in quitting. What barriers are holding you back from using assistance to quit?"

226

STEP 3: REFER

- REFER tobacco users to other resources

  Referral options:
  - A doctor, a nurse, a pharmacist, or another clinician, for additional counseling
  - A hospital-based group program
  - Anti-Smoking Clinics
  - The toll-free telephone quitline: **937**

BRIEF COUNSELING: ASK, ADVISE, REFER (Summary)

- **Brief interventions have been shown to be effective**
- **In the absence of time or expertise:**
  - Ask, advise, and refer to other resources, such as the quitline **937**

> This brief intervention can be achieved in less than 1 minute.

MAKE a COMMITMENT...

Address tobacco use
with all patients.

At a minimum,
make a commitment to incorporate brief tobacco interventions as part of routine patient care.

Ask, Advise, and Refer.

HELPING PATIENTS QUIT IS a CLINICIAN'S RESPONSIBILITY

TOBACCO USERS DON'T PLAN TO FAIL. MOST FAIL TO PLAN.

Clinicians have a professional obligation
to address tobacco use and can have
an important role in helping patients
plan for their quit attempts.

**THE DECISION TO QUIT LIES
IN THE PATIENT'S HANDS.**

IF YOU DON'T SAY ANYTHING...

You inadvertently give patients...

a reason to smoke, and therefore a reason
not to quit.

**"How bad could my smoking be, if my
respiratory therapist never said
anything to me?"**

**It is not necessary to conduct the entire
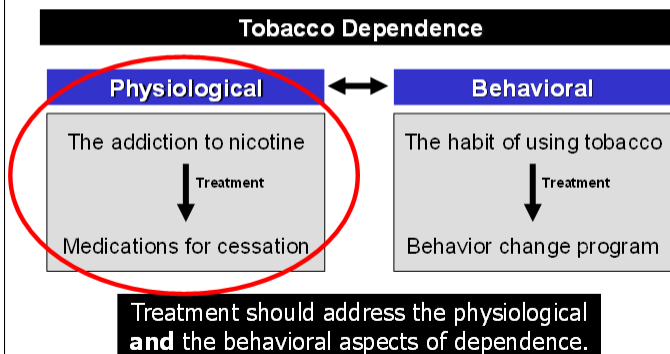cessation program, just get it started.**

Rx for CHANGE
Tobacco Cessation in Respiratory Care

MEDICATIONS for
SMOKING CESSATION

TOBACCO DEPENDENCE:
A 2-PART PROBLEM

Tobacco Dependence

Physiological		Behavioral
The addiction to nicotine	↔	The habit of using tobacco
↓ Treatment		↓ Treatment
Medications for cessation		Behavior change program

Treatment should address the physiological **and** the behavioral aspects of dependence.

MEDICATIONS for
CESSATION

FDA-approved and available in Saudi Arabia

Nicotine lozenge
- Nicorette Lozenge (OTC)
- Nicorette Mini Lozenge (OTC)
- Generic nicotine lozenge (OTC)

Nicotine transdermal patch
- NicoDerm CQ (OTC)
- Generic nicotine patches (OTC, Rx)

Varenicline (Champix)

Bupropion SR (Wellbutrin)

FDA-approved but not available in Saudi Arabia

Nicotine polacrilex gum
- Nicorette (OTC)
- Generic nicotine gum (OTC)

Nicotine nasal spray
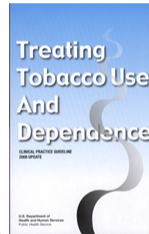- Nicotrol NS (Rx)

Nicotine inhaler
- Nicotrol (Rx)

These are the only medications that are approved by the FDA for smoking cessation.

PHARMACOTHERAPY

"Clinicians should encourage all patients attempting to quit to use effective medications for tobacco dependence treatment, except where contraindicated or for specific populations* for which there is insufficient evidence of effectiveness."

Treating Tobacco Use And Dependence
CLINICAL PRACTICE GUIDELINE 2008 UPDATE
U.S. Department of Health and Human Services
Public Health Service

* Includes pregnant women, smokeless tobacco users, light smokers, and adolescents.

Medications significantly improve success rates.

Fiore et al. (2008). *Treating Tobacco Use and Dependence: 2008 Update. Clinical Practice Guideline.* Rockville, MD: USDHHS, PHS.

PHARMACOTHERAPY: USE in PREGNANCY

- The Clinical Practice Guideline makes no recommendation regarding use of medications in pregnant smokers
  - Insufficient evidence of effectiveness
- Category C: varenicline, bupropion SR
- Category D: prescription formulations of NRT

"Because of the serious risks of smoking to the pregnant smoker and the fetus, whenever possible pregnant smokers should be offered person-to-person psychosocial interventions that exceed minimal advice to quit."

Fiore et al. (2008). *Treating Tobacco Use and Dependence: 2008 Update. Clinical Practice Guideline.* Rockville, MD: USDHHS, PHS.

PHARMACOTHERAPY: OTHER SPECIAL POPULATIONS

Pharmacotherapy is **not** recommended for:

- Smokeless tobacco users
  - Not indicated for smokeless tobacco cessation
- Individuals smoking fewer than 10 cigarettes per day
- Adolescents
  - Nonprescription sales (patch, lozenge) are restricted to adults ≥18 years of age
  - NRT use in minors requires a prescription

Recommended treatment is behavioral counseling.

Fiore et al. (2008). *Treating Tobacco Use and Dependence: 2008 Update. Clinical Practice Guideline.* Rockville, MD: USDHHS, PHS.

NICOTINE REPLACEMENT THERAPY (NRT): RATIONALE for USE

- Reduces physical withdrawal from nicotine

- Eliminates the immediate, reinforcing effects of nicotine that is rapidly absorbed via tobacco smoke

- Allows patient to focus on behavioral and psychological aspects of tobacco cessation

The use of NRT products approximately doubles quit rates.

PLASMA NICOTINE CONCENTRATIONS for NICOTINE-CONTAINING PRODUCTS
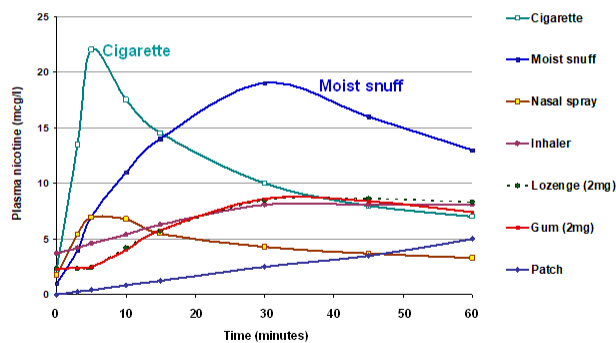
Medications Available in Saudi Arabia

Nicotine lozenge
- Nicorette Lozenge (OTC)
- Nicorette Mini Lozenge (OTC)
- Generic nicotine lozenge (OTC)

Nicotine transdermal patch
- NicoDerm CQ (OTC)
- Generic nicotine patches (OTC, Rx)

Varenicline (Champix)

Bupropion SR (Wellbutrin)

NICOTINE LOZENGE
Nicorette Lozenge and Nicorette Mini Lozenge; generics

- Nicotine polacrilex formulation
  - Delivers ~25% more nicotine than equivalent gum dose

- Sugar-free mint, cherry flavors

- Contains buffering agents to enhance buccal absorption of nicotine

- Available: 2 mg, 4 mg

NICOTINE LOZENGE: DOSING

Dosage is based on the "time to first cigarette" (TTFC) as an indicator of nicotine dependence

Use the 2 mg lozenge:

If you smoke your first cigarette more than 30 minutes after waking

Use the 4 mg lozenge:

If you smoke your first cigarette of the day within 30 minutes of waking

---

NICOTINE LOZENGE: DOSING (cont'd)

Recommended Usage Schedule for the Nicotine Lozenge		
Weeks 1–6	Weeks 7–9	Weeks 10–12
1 lozenge q 1–2 h	1 lozenge q 2–4 h	1 lozenge q 4–8 h
DO NOT USE MORE THAN 20 LOZENGES PER DAY.		

NICOTINE LOZENGE: DIRECTIONS for USE

- Use according to recommended dosing schedule
- Place in mouth and allow to dissolve slowly (nicotine release may cause warm, tingling sensation)
- Do not chew or swallow lozenge
- Occasionally rotate to different areas of the mouth
- Lozenges will dissolve completely in about 20–30 minutes

NICOTINE LOZENGE: ADDITIONAL PATIENT EDUCATION

- To improve chances of quitting, use at least nine lozenges daily during the first 6 weeks
- The lozenge will *not* provide the same rapid satisfaction that smoking provides
- The effectiveness of the nicotine lozenge may be reduced by some foods and beverages:
  - Coffee
  - Juices
  - Soft drinks

Do NOT eat or drink for 15 minutes BEFORE or while using the nicotine lozenge.

NICOTINE LOZENGE: ADD'L PATIENT EDUCATION (cont'd)

- Side effects of the nicotine lozenge include
  - Nausea
  - Hiccups
  - Cough
  - Heartburn
  - Headache
  - Flatulence
  - Insomnia

NICOTINE LOZENGE: SUMMARY

ADVANTAGES

- Might serve as an oral substitute for tobacco
- Use might delay weight gain
- Can be titrated to manage withdrawal symptoms
- Can be used in combination with other agents to manage situational urges

DISADVANTAGES

- Need for frequent dosing can compromise adherence
- Gastrointestinal side effects (nausea, hiccups, heartburn) might be bothersome

---

TRANSDERMAL NICOTINE PATCH
NicoDerm CQ; generic

- Nicotine is well absorbed across the skin
- Delivery to systemic circulation avoids hepatic first-pass metabolism
- Plasma nicotine levels are lower and fluctuate less than with smoking

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TRANSDERMAL NICOTINE PATCH:
PREPARATION COMPARISON

Nicotine delivery	24 hours
Availability	Rx/OTC
Patch strengths	7 mg 14 mg 21 mg

TRANSDERMAL NICOTINE PATCH: DOSING

Light Smoker	Heavy Smoker
≤10 cigarettes/day	>10 cigarettes/day
Step 2 (14 mg x 6 weeks)	Step 1 (21 mg x 4 weeks)
Step 3 (7 mg x 2 weeks)	Step 2 (14 mg x 2 weeks)
	Step 3 (7 mg x 2 weeks)

TRANSDERMAL NICOTINE PATCH: DIRECTIONS for USE

- Choose an area of skin on the upper body or upper outer part of the arm
- Make sure skin is clean, dry, hairless, and not irritated
- Apply patch to different area each day
- Do not use same area again for at least 1 week
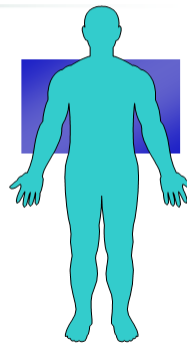
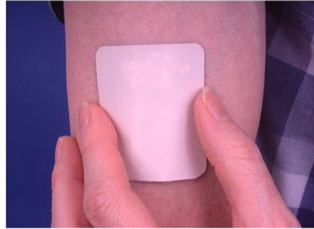## TRANSDERMAL NICOTINE PATCH: DIRECTIONS for USE (cont'd)

- Remove patch from protective pouch
- Peel off half of the backing from patch

TRANSDERMAL NICOTINE PATCH: DIRECTIONS for USE (cont'd)

- Apply adhesive side of patch to skin

- Peel off remaining protective covering

- Press firmly with palm of hand for 10 seconds

- Make sure patch sticks well to skin, especially around edges

---

TRANSDERMAL NICOTINE PATCH: DIRECTIONS for USE (cont'd)

- Wash hands: Nicotine on hands can get into eyes or nose and cause stinging or redness

- Do not leave patch on skin for more than 24 hours— doing so may lead to skin irritation

- Adhesive remaining on skin may be removed with rubbing alcohol or acetone

- Dispose of used patch by folding it onto itself, completely covering adhesive area

---

TRANSDERMAL NICOTINE PATCH: ADDITIONAL PATIENT EDUCATION

- Water will not harm the nicotine patch if it is applied correctly; patients may bathe, swim, shower, or exercise while wearing the patch

- Do *not* cut patches to adjust dose
  - Nicotine may evaporate from cut edges
  - Patch may be less effective

- Keep new and used patches out of the reach of children and pets

- Remove patch before MRI procedures

TRANSDERMAL NICOTINE PATCH: ADD'L PATIENT EDUCATION (cont'd)

- Side effects to expect in first hour:
  - Mild itching
  - Burning
  - Tingling

- Additional possible side effects:
  - Vivid dreams or sleep disturbances
  - Headache

TRANSDERMAL NICOTINE PATCH: ADD'L PATIENT EDUCATION (cont'd)

- After patch removal, skin may appear red for 24 hours
  - If skin stays red more than 4 days or if it swells or a rash appears, contact health care provider—do not apply new patch

- Local skin reactions (redness, burning, itching)
  - Usually caused by adhesive
  - Up to 50% of patients experience this reaction
  - Fewer than 5% of patients discontinue therapy
  - Avoid use in patients with dermatologic conditions (e.g., psoriasis, eczema, atopic dermatitis)

TRANSDERMAL NICOTINE PATCH: SUMMARY

ADVANTAGES

- Once daily dosing associated with fewer adherence problems
- Of all NRT products, its use is least obvious to others
- Can be used in combination with other agents; delivers consistent nicotine levels over 24 hrs

DISADVANTAGES

- When used as monotherapy, cannot be titrated to acutely manage withdrawal symptoms
- Not recommended for use by patients with dermatologic conditions (e.g., psoriasis, eczema, atopic dermatitis)

237

VARENICLINE
Champix

- Nonnicotine cessation aid

- Partial nicotinic receptor agonist

- Oral formulation

CHX 0.5

CHX 1.0

VARENICLINE:
MECHANISM of ACTION

- Binds with high affinity and selectivity at $\alpha_4\beta_2$ neuronal nicotinic acetylcholine receptors

  - Stimulates low-level agonist activity

  - Competitively inhibits binding of nicotine

- Clinical effects

  - $\downarrow$ symptoms of nicotine withdrawal

  - Blocks dopaminergic stimulation responsible for reinforcement & reward associated with smoking

---

VARENICLINE:
WARNINGS and PRECAUTIONS

- Neuropsychiatric symptoms and suicide risk

  - Changes in mood (including depression and mania)

  - Psychosis/hallucinations/paranoia/delusions

  - Homicidal ideation

  - Aggression/hostility/anxiety/panic

  - Suicidal ideation, suicide attempt, completed suicide

FDA boxed warning removed Dec 2016

Advise patients to stop taking Varenicline and contact a health care provider immediately if symptoms such as agitation, depressed mood, or changes in behavior or thinking that are not typical are observed or if the patient develops suicidal ideation or suicidal behavior.

VARENICLINE: WARNINGS and PRECAUTIONS (cont'd)

In some patients, use of varenicline has been associated with:

- Seizures
- Accidental injury
- Cardiovascular events
- Angioedema and hypersensitivity reactions
- Serious skin reactions

These are rare events and most have not been causally linked to varenicline use.

VARENICLINE: DOSING

Patients should begin therapy 1 week PRIOR to their quit date. The dose is gradually increased to minimize treatment-related nausea and insomnia.

Treatment Day		Dose
Day 1 to day 3	CHX 0.5	0.5 mg qd
Day 4 to day 7	CHX 0.5 CHX 0.5	0.5 mg bid
Day 8 to end of treatment*	CHX 1.0 CHX 1.0	1 mg bid

Initial dose titration refers to Day 1 to day 7.

* Up to 12 weeks

VARENICLINE: ADVERSE EFFECTS

- Common (≥5% and 2-fold higher than placebo)
  - Nausea
  - Sleep disturbances (insomnia, abnormal dreams)
  - Constipation
  - Flatulence
  - Vomiting

VARENICLINE: ADDITIONAL PATIENT EDUCATION

- Doses should be taken after eating, with a full glass of water

- Nausea and insomnia are usually temporary side effects

  - If symptoms persist, notify your health care provider

- May experience vivid, unusual or strange dreams during treatment

- Use caution driving and operating machinery until effects of quitting smoking with varenicline are known

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VARENICLINE: SUMMARY

ADVANTAGES

- Oral dosing is simple and associated with fewer adherence problems
- Offers a different mechanism of action for persons who have failed other agents

DISADVANTAGES

- Should be taken with food or a full glass of water to reduce the incidence of nausea
- Patients should be monitored for potential neuropsychiatric symptoms
- Post-marketing surveillance data indicate potential for neuropsychiatric symptoms and adverse effects not shown to be prevalent in randomized trials

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BUPROPION SR
Wellbutrin; generics

- Nonnicotine cessation aid
- Sustained-release antidepressant
- Oral formulation

240

BUPROPION: MECHANISM of ACTION

- Atypical antidepressant thought to affect levels of various brain neurotransmitters
  - Dopamine
  - Norepinephrine
- Clinical effects
  - ↓ craving for cigarettes
  - ↓ symptoms of nicotine withdrawal

BUPROPION: CONTRAINDICATIONS

- Patients with a seizure disorder
- Patients with a current or prior diagnosis of bulimia or anorexia nervosa
- Patients undergoing abrupt discontinuation of alcohol, benzodiazepines, barbiturates and antiepileptic drugs
- Patients taking MAO inhibitors (within 14 days of initiating or discontinuing therapy)

BUPROPION: WARNINGS and PRECAUTIONS

- Neuropsychiatric symptoms and suicide risk
  - Changes in mood (including depression and mania)
  - Psychosis/hallucinations/paranoia/delusions
  - Homicidal ideation
  - Aggression/hostility/anxiety/panic
  - Suicidal ideation, suicide attempt, completed suicide

FDA boxed warning removed Dec 2016

Advise patients to stop taking bupropion SR and contact a health care provider immediately if symptoms such as agitation, depressed mood, or changes in behavior or thinking that are not typical are observed or if the patient develops suicidal ideation or suicidal behavior.

BUPROPION: WARNINGS and PRECAUTIONS (cont'd)

Bupropion should be used with caution in the following populations:

- Patients with an elevated risk for seizures, including:

  - Severe head injury

  - Concomitant use of medications that lower the seizure threshold (e.g., other bupropion products, antipsychotics, tricyclic antidepressants, theophylline)

  - Severe hepatic impairment

- Patients with underlying neuropsychiatric conditions

For a comprehensive listing of warnings and precautions, refer to the manufacturer's prescribing information.

BUPROPION SR: DOSING

To ensure that therapeutic plasma levels of the drug are achieved, patients should begin therapy 1 to 2 weeks PRIOR to their quit date.

Initial treatment
- 150 mg po q AM for 3 days

Then...
- 150 mg po bid for 7–12 weeks
- Doses must be administered at least 8 hours apart
- Tapering not necessary when discontinuing therapy

BUPROPION: ADVERSE EFFECTS

Common side effects include the following:
- Insomnia (avoid bedtime dosing)
- Dry mouth

Less common but reported effects:
- Tremor
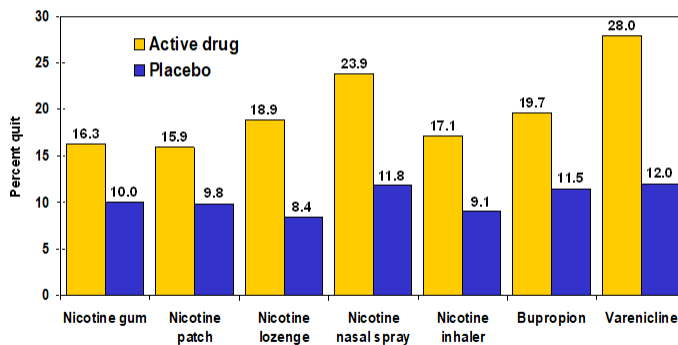- Skin rash

BUPROPION SR: SUMMARY

ADVANTAGES

- Oral dosing is simple and associated with fewer adherence problems
- Might delay weight gain
- Bupropion might be beneficial in patients with depression
- Can be used in combination with NRT agents

DISADVANTAGES

- Seizure risk is increased
- Several contraindications and precautions preclude use in some patients
- Patients should be monitored for neuropsychiatric symptoms

LONG-TERM (≥6 month) QUIT RATES for AVAILABLE CESSATION MEDICATIONS

Bar chart — Percent quit. Active drug (yellow) vs Placebo (blue):

- Nicotine gum: 16.3 / 10.0
- Nicotine patch: 15.9 / 9.8
- Nicotine lozenge: 18.9 / 8.4
- Nicotine nasal spray: 23.9 / 11.8
- Nicotine inhaler: 17.1 / 9.1
- Bupropion: 19.7 / 11.5
- Varenicline: 28.0 / 12.0

Data adapted from Cahill et al. (2012). *Cochrane Database Syst Rev*; Hughes et al. (2014). *Cochrane Database Syst Rev*; and Stead et al. (2012). *Cochrane Database Sys Rev*.

COMBINATION PHARMACOTHERAPY

Regimens with enough evidence to be "recommended" first-line

- **Combination NRT**

  Long-acting formulation (patch)
    - Produces relatively constant levels of nicotine

  PLUS

  Short-acting formulation (lozenge)
    - Allows for acute dose titration as needed for nicotine withdrawal symptoms

- **Bupropion SR + Nicotine Patch**

TREATMENT OPTIONS

Multiple Treatment Comparison Meta-Analysis

Comparison	Odds ratio (95% CI)
Nicotine gum vs Placebo	**1.7** (1.5–1.9)
Bupropion SR vs Placebo	**1.9** (1.6–2.1)
Nicotine patch vs Placebo	**1.9** (1.7–2.1)
Other NRT* vs Placebo	**2.0** (1.8–2.4)
Combination NRT vs Placebo	**2.7** (2.1–3.7)
Varenicline vs Placebo	**2.9** (2.4–3.5)

*Includes nicotine nasal spray, lozenge, and inhaler

Strong evidence that combination NRT is more effective than NRT monotherapy

Cahill et al. (2013). *Cochrane Database Syst Rev* 5:CD009329.

COMBINATION NRT: Treatment Regimens

- **Nicotine patch**
  Dose: 21 mg/day x 4–6 wks → 14 mg/day x 2 wks → 7 mg/day x 2 wks

  PLUS

- **Nicotine lozenge** (2 mg/4 mg; based on TTFC)
  Dose: Use 1 piece q 1–2 hours as needed (use at least 4-5/day)

IDENTIFY KEY ISSUES to STREAMLINE PRODUCT SELECTION*

- Do you prefer a prescription or nonprescription medication?

- Would it be a challenge for you to take a medication frequently throughout the day (e.g., a minimum of 9 times)?
  - With the exception of the nicotine patch, all NRT formulations require <u>frequent</u> dosing throughout the day.
  - If patient is unable to adhere to the recommended dosing, these products should be <u>ruled out</u> as monotherapy because they will be ineffective.

Asking these two questions will significantly reduce the time required for product selection.

* Product-specific screening—for warnings, precautions, contraindications, and personal preferences—is also essential.
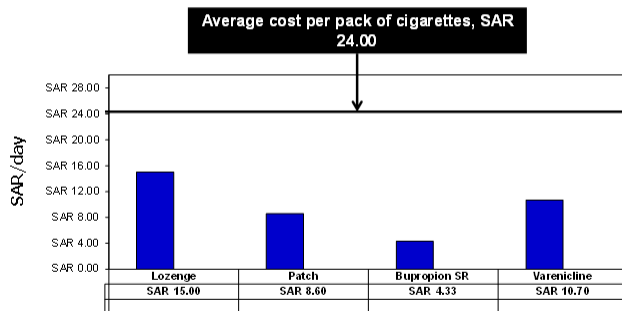
ADHERENCE IS KEY to QUITTING

- Promote adherence with prescribed regimens

- Use according to dosing schedule, NOT as needed

- Consider telling the patient:
  "When you use a cessation product, it is important to read all the directions thoroughly before using the product. The products work best in alleviating withdrawal symptoms when used correctly, and according to the recommended dosing schedule."

COMPARATIVE DAILY COSTS of PHARMACOTHERAPY

	Lozenge	Patch	Bupropion SR	Varenicline
	SAR 15.00	SAR 8.60	SAR 4.33	SAR 10.70

Average cost per pack of cigarettes, SAR 24.00

SUMMARY

- To maximize success, interventions should include counseling and one or more medications

- Clinicians should encourage the use of effective medications by all patients attempting to quit smoking
  - Exceptions include medical contraindications or use in specific populations for which there is insufficient evidence of effectiveness

- First-line medications that reliably increase long-term smoking cessation rates include the following:
  - Bupropion SR
  - Nicotine replacement therapy (lozenge, patch)
  - Varenicline

- Use of effective combinations of medications should be considered