

# Smoking cessation in review

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## Abstract

The smoking habit is particularly rife in South Africa, compared to the rest of the world. Although smoking rates in South Africa have been declining since the implementation of tobacco control measures in 1993, we still have an estimated eight million smokers in the country. Smoking has been associated with detrimental health risks and related complications for decades, and such health issues are further compounded by the high incidence of tuberculosis and HIV/AIDS in the South African population. This article aims to provide an overview of the importance of smoking cessation, and the non-pharmacological and pharmacological measures aimed at successfully quitting the habit of smoking.

**Keywords:** smoking, smoking cessation, nicotine, nicotine replacement therapy, electronic cigarettes, vaping, varenicline

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## Introduction

The smoking habit is associated with a number of detrimental health outcomes and associated complications, and it has long been established as a modifiable risk factor for a variety of cardiac, vascular and pulmonary diseases. As such, the cessation of the smoking habit is in any patient's best interest.

## Prevalence of tobacco use in South-Africa

In line with the requirements of the Framework Convention on Tobacco Control, the South African government implemented comprehensive tobacco control measures back in 1993, with further amendments in 2007.<sup>1</sup> Although smoking rates have declined by 32% since 1993, there are still an estimated eight million (16.4%) smokers in South Africa.<sup>2</sup> South Africa has a particularly high prevalence of smoking, compared to the rest of the world.<sup>3</sup> The effects of smoking are exacerbated by infectious risk factors of COPD, like tuberculosis and HIV infection, of which South Africa has some of the highest burdens globally.<sup>3</sup> The mortality rate amongst current smokers in South Africa is nearly double that of non- or ex-smokers.<sup>4</sup> Up to a third of all male deaths in South Africa, in adults over the age of 35 years, have recently been attributed to tobacco use in one form or another. The cost of smoking-related disease to the South African economy is estimated to be in the region of R1.2 billion annually.<sup>3</sup>

Although tobacco use is a leading cause of morbidity and mortality in adults, it can be seen as a disease of adolescence, with more than half of new smokers having their first cigarette before the age of 18 years.<sup>5</sup> The vast majority (99%) of adult smokers started using tobacco before the age of 26 years.<sup>5</sup> This may be a motivation to target this population group when developing smoking cessation strategies.

## Nicotine dependence

Tobacco products contain nicotine, which is the drug that produces dependence in smokers.<sup>6</sup> Nicotine affects the dopaminergic

system in the brain, causing a sense of wellbeing, and also increases the number of nicotinic receptors.<sup>7,8</sup> Nicotine may be as addictive as heroin, cocaine or alcohol, yet can be seen as the most socially accepted form of chemical dependence.<sup>6</sup> Nicotine withdrawal symptoms, including headaches, coughing, cravings and increased appetite can be a major barrier to the process of smoking cessation.<sup>7</sup> Sudden mood changes, irritability and restlessness may also cause resistance from the support system or close relations of the patient trying to quit.<sup>7</sup> Smoking is an addictive habit, with strong connotations to emotions and thoughts, but is also intimately linked to the smoker's daily activities and rituals, like driving or having meals.<sup>6,7</sup> For this reason, it is important to deal with the actual nicotine dependence of a patient, but also to introduce cognitive-behavioural therapy to manage the emotional attachment to smoking.<sup>7</sup>

## Tobacco use in HIV and TB

Tobacco use has multiple effects on the immune system, by impacting the circulating immune cells, mucosal surface defences and other immune cell functions, which result in it being a leading cause of respiratory infections.<sup>4</sup> It has been shown that HIV-positive patients that use tobacco products have a significantly increased mortality rate compared to those who never smoked, doubling the mortality of smokers with HIV-infection.<sup>9</sup> In South Africa, in 2018 for example, it was estimated that around 20.4% of the population (or 7.7 million people) were living with HIV, with about 71 000 AIDS-related deaths that year. We have the biggest, most prominent HIV/AIDS epidemic in the world.<sup>10</sup>

Smoking cessation has been shown to reduce the risk for bacterial pneumonia and *Pneumocystis jirovecii* pneumonia in HIV-positive patients by about 27%.<sup>11</sup> HIV-positive patients who smoke, have a 20-times greater risk of developing TB than non-smokers infected with HIV.<sup>11</sup>

## Non-pharmacological approaches to smoking cessation

The non-pharmacological approaches to quitting smoking mostly involve motivational interviews and counselling, but other measures include cognitive behavioural approaches, hypnotherapy and acupuncture, or electro-stimulation.<sup>3,8</sup> Counselling may be performed in several ways including telephone or on-line counselling, group counselling or one-on-one patient counselling.<sup>6,8</sup> The counselling method has shown success when at least three or more sessions have been attended, or when the counselling is supported by the use of medication to manage the nicotine withdrawal.<sup>3,8</sup>

Cognitive behavioural approaches assist patients in changing their habits associated with smoking and to help motivate patients to quit.<sup>8</sup> Hypnotherapy is proposed to lessen the desire to smoke and/or improve the will to quit; however, no clinical trial has provided convincing efficacy data to show an advantage of hypnosis for smoking cessation.<sup>3,8</sup>

Acupuncture and electro-stimulation are promoted to aid in smoking cessation by reducing withdrawal symptoms.<sup>3,8</sup> Review studies comparing these therapies to placebo did not show any benefit in the number of people who successfully quit smoking.<sup>3,8</sup>

### Identifying the patient

The identification of smokers that are ready to quit, may be enhanced by asking the question whilst assessing the relevant patients' vital signs, for example, whenever they attend primary care facilities.<sup>3</sup> (Within the dispensary, the pharmacist is also ideally placed to initiate such a conversation with their patients or clients.) Encouragement and assistance provided by more members of the multidisciplinary healthcare team will also increase the likelihood of abstinence.<sup>3</sup> According to the toolkit of the World Health Organization<sup>7</sup> (WHO) for brief tobacco interventions, the primary healthcare provider can use the 5 As (see Figure 1) to help identify



Figure 1: The 5 A's—Interventions for patients that are ready to quit<sup>7</sup>

patients who are ready to quit. The process can also be used to identify the patient who does not want to quit or who does not think that it is important to quit.<sup>7</sup> In these patients, the 5 Rs model (Figure 2) can be used in a motivational counselling intervention to prepare such patients to change their minds about smoking cessation.<sup>7</sup>

The 5 As model can assist in identifying patients who are ready to quit and proceed to assist them with advice about tobacco use.<sup>7</sup> "Ask" will systematically identify all tobacco users visiting the healthcare facility.<sup>7</sup> Inquiries should be made in a friendly, non-accusatory way, and tobacco use should be indicated on all medical notes.<sup>7</sup> "Advise" should be tailored to the specific patient, should be clear and strong, and must be aimed at persuading the patient to quit.<sup>7</sup> "Assess" will be a measure of the willingness of the patient to make an attempt to quit.<sup>7</sup> "Assist" will be the action of the healthcare worker to support the patient in developing a specific plan to quit, and of providing support and recommendations on the use of medication.<sup>7</sup> "Arrange" is the planning of follow-up visits or contact with the patient, either in person or by telephone.<sup>7</sup>

The 5 Rs model can be used as a guideline towards a motivational intervention tool to assist patients who are not ready to quit.<sup>7</sup> "Relevance" is used to point out to the patient how quitting is personally relevant to him/her.<sup>7</sup> "Risks" will encourage the patient to identify potential negative consequences of tobacco use that are relevant to him/her.<sup>7</sup> These risks may include the cardiovascular threats like myocardial infarction (MI) and stroke, and other illnesses like lung cancer and COPD, but also a threat to wealth or the ensuing financial burden.<sup>7</sup>

"Rewards" means to make the patient aware of the potential benefits of stopping tobacco use, for example improved health, improved sense of smell and taste, saving money and a general improvement in their feeling of wellbeing.<sup>7</sup> It is important to identify "Roadblocks" or barriers to quitting tobacco products and to provide advice on treatment options to address such barriers,



Figure 2: The 5 R's—Motivational interventions for patients that are not yet ready to quit<sup>7</sup>

like withdrawal symptoms, weight gain, depression and the presence of other tobacco users.<sup>7</sup> "Repetition" is indicated if the patient is still not ready to quit, in which case the patient should be re-assessed for his/her readiness to quit and the intervention should therefore be repeated at a later stage.<sup>7</sup>

Identifying patients who are ready to quit smoking and motivational measures to assist patients to quit smoking should be every healthcare provider's responsibility.<sup>12</sup> Motivational interviewing is an evidence-based approach to assist patients to change their habits concerning tobacco use.<sup>12</sup> However, counselling and medication have both been shown to be effective in treating tobacco dependence, but using medication together with counselling has been shown to be more effective than either of the two strategies on their own.<sup>6</sup>

## Pharmacological interventions

Suitable pharmacotherapy should be instituted in conjunction with behavioural and supportive therapy. Table I summarises the therapeutic options that are currently available or on the horizon.

### Nicotine replacement therapy (NRT)

Nicotine in itself has a relatively short half-life, and is not well absorbed.<sup>3,13,14</sup> For this reason, some of the preparations should be taken 1–2 hourly (sublingual tablets) and the patches should be replaced daily.<sup>3,13,14</sup> When used in conjunction with professional counselling and supportive therapy, the likelihood of reducing the addiction more than doubles.<sup>3,13,14</sup> When used on its own, the chances of successful cessation of smoking are the same as for placebo.<sup>3,13,14</sup> The side-effects of these agents include nausea and gastrointestinal cramps, cough, insomnia and muscle pains. Nicotine may cause coronary spasms in patients with cardiac conditions such as myocardial infarction, acute stroke, cardiac arrhythmias, and angina (i.e. the stable, unstable or Prinzmetal's variants). Using nicotine patches may result in local irritation to the skin.<sup>3,13,14</sup> The use of NRT has been shown to be more effective when combined with a dopamine re-uptake inhibitor such as bupropion.<sup>3,13,14</sup>

### Antidepressant agents

Bupropion hydrochloride, initially taken at a dosage of 150 mg daily for three days, and then increased to 150 mg twice daily, may be used with NRT or on its own. Bupropion lowers the seizure threshold, and patients that are at risk for the development of

seizures should use an alternative option. This agent should also not be administered to patients with a current or previous diagnosis of an eating disorder, or bipolar mood disorder.<sup>3,13</sup>

Nortriptyline is an active metabolite of amitriptyline and although not currently registered in South Africa, is used elsewhere for patients that have failed nicotine replacement therapy and bupropion/varenicline.<sup>3,13</sup>

### Nicotine-receptor partial agonists

Varenicline is available in South Africa and should be used in combination with behavioural therapy.<sup>3,15</sup> Reports of an increase in suicide or suicidal behaviour have been noted amongst patients taking this drug.<sup>3,15</sup> Therefore, when patients are initiated on this agent, they should be monitored for any behavioural or neuropsychiatric changes.<sup>16</sup> Other agents that are currently being used, but that are not yet available in South Africa, include cytisine and dianiline.<sup>3,15</sup> These agents act as partial agonists of the central, high-affinity  $\alpha_4\beta_2$ -containing, nicotinic acetylcholine receptors (nAChRs).<sup>17</sup> This should relieve withdrawal symptoms and cravings in individuals whilst they are attempting the cessation of the smoking habit, through their activation of the  $\alpha_4\beta_2$  nAChRs and by competing with nicotine at its receptor-binding sites.<sup>17,18</sup>

### Nicotine vaccines

There is no clear evidence available that supports the idea that nicotine vaccines will enhance long-term smoking cessation.<sup>19</sup> At the time of publication, no such vaccine has been licensed in South Africa yet, but the search for an effective and usable nicotine vaccine is still ongoing.<sup>19</sup>

### Another possible approach: the CDC's Tips From Former Smokers<sup>®</sup>, or Tips<sup>®</sup> campaign

During the 2012–2018 time period, the United States Centers for Disease Control and Prevention (the CDC), estimated that around 16.4 million people attempted to quit smoking through the use of Tips<sup>®</sup>, of which around one million (6.1%) managed to stop smoking for good. The Tips<sup>®</sup> campaign was launched in March 2012, and basically entails a paid national tobacco education programme. The premise behind this programme is to let real people share compelling stories of having to live with, and suffer from, smoking-related diseases and disabilities (including those caused by second-hand, or passive, tobacco smoking), as well as the impact and ongoing suffering they have to endure because of this.<sup>20</sup>

**Table I:** Pharmacotherapeutic options aimed at achieving smoking cessation<sup>3,13-16</sup>

Class	Medicines/Formulations	Mechanism of action
Nicotine replacement therapy (NRT)	Nicotine transdermal patches	To partially provide nicotine that would otherwise be ingested from cigarettes, which will act by relieving the psychological and physical withdrawal syndrome.
	Nicotine gum	
	Nicotine oral spray	
Antidepressant agents	Bupropion	Increases dopamine activity in the <i>nucleus accumbens</i> , by acting as a re-uptake inhibitor of dopamine. It is also a weak uptake inhibitor of both serotonin and noradrenaline.
Nicotine-receptor agonists	Varenicline	Acts as a partial agonist of nicotinic acetylcholine receptors; thereby maintaining moderate levels of dopamine to counteract withdrawal symptoms.
Nicotine vaccine	Not yet available in South Africa	Induces antibodies that bind to nicotine; thereby reducing the availability of nicotine that can otherwise bind to the central receptors.

The CDC's message is clear:<sup>20</sup>

- either never smoke, or
- if you are a smoker, quit as soon as possible.

Table II outlines some of the most prominent health issues that are caused by, made worse by, or associated with, either active or passive smoking.

**Table II:** Prominent health issues\* that may be caused by, made worse by, or are associated with, smoking (either active or passive smoking), as adapted from the CDC's list of focus areas for their Tips® campaign<sup>20</sup>

<b>Malignancies</b>	Cancer of the lungs, throat, head and neck, as well as colorectal cancer
<b>Cardiovascular disease</b>	Heart disease, including myocardial infarction
	Stroke
	Buerger's disease (the presence, associated with tobacco use, of inflammation and thrombosis in small and medium-sized blood vessels, usually in the extremities—especially the lower extremities—that result in gangrene)
<b>Pulmonary conditions</b>	Asthma
	COPD
<b>Endocrine-metabolic conditions</b>	Diabetes mellitus
<b>Oral health issues</b>	Gum disease
<b>Reproductive health issues</b>	Preterm birth
<b>Immunological conditions</b>	HIV-infection
<b>Special senses</b>	Vision loss and blindness
<b>Mental health issues</b>	Depression and anxiety

COPD – Chronic obstructive pulmonary disease; HIV – Human immunodeficiency virus  
\*This is not an exhaustive list.

According to the CDC, smoking can cause immediate damage from the moment of first exposure and should be avoided at all costs. Another aspect that they highlight, is the term 'dual use', which has been coined to refer to smokers that concurrently use both regular cigarettes, as well as electronic cigarettes (or vaping) and other forms of so-called smokeless tobacco.<sup>6,8,20</sup> These alternatives to regular cigarettes (or cigars, or pipe smoking) do not protect the user from all the harmful effects of smoking.

## Conclusion

The desire to quit smoking is paramount to the successful execution of a smoking cessation programme. Potential patients need to be identified as part of routine primary care practices. Those that are wanting to quit could be initiated on the WHO's 5 As model, whilst those that are not yet ready to give up their habit may be guided through the 5 Rs model. Successful smoking cessation requires a combination of behavioural therapy, social support,

and the appropriate use of the relevant pharmacotherapeutic interventions. Furthermore, public awareness about the dangers and health risks associated with both active and passive smoking, and active encouragement of smokers to try and quit their habit, are vital to the future wellbeing of our society at large. Non-smokers need to be protected from the harmful effects of second-hand smoking as well.

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