

# Clearing the air: methods and challenges of smoking and vaping cessation

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## Abstract

South Africa has a particularly high prevalence of smoking compared to the rest of the world. In spite of the fact that smoking rates in South Africa have been declining since the implementation of tobacco control measures in 1993, there are still 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 human immunodeficiency virus/acquired immune deficiency syndrome in the population. Vaping has been offered as an alternative for smoking. This article aims to provide an overview of the importance of smoking cessation, and the nonpharmacological and pharmacological measures aimed at ensuring quitting.

The vaping trend is fueled by the assumption that these products are safer and less harmful than traditional tobacco smoking. The rapid growth of the vaping industry has prompted debates on whether vaping functions as a smoking cessation aid or a gateway for new smokers. The evidence regarding vaping's efficacy in aiding smoking cessation is inconsistent, but there is compelling data suggesting a correlation between vaping and an increase in the number of smokers, particularly among the youth. Notwithstanding the well-established research on the greater harm of tobacco, early studies have already indicated the adverse effects of vaping. Despite the lack of comprehensive health studies, the expanding popularity of electronic cigarettes or electronic nicotine delivery systems such as vapes, especially among the younger demographic, has soared.

**Keywords:** smoking, smoking cessation, nicotine, nicotine replacement therapy

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## Introduction

In line with the requirements of the World Health Organization (WHO) Framework Convention on Tobacco Control, the South African government implemented comprehensive tobacco control measures 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 chronic obstructive pulmonary disease (COPD), like tuberculosis and human immunodeficiency virus (HIV), of which South Africa has one of the highest burdens globally.<sup>3</sup> The mortality rate for 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 aged 35 years and older, have recently been attributed to tobacco use. The cost of smoking-related disease to the South African economy is estimated to be R1.2 billion annually.<sup>3</sup>

The popularity of electronic cigarettes (EC) is on the rise among smokers globally.<sup>5</sup> Users commonly cited reasons such as aiding in smoking cessation, alleviating withdrawal symptoms from traditional cigarettes, saving money, and seeking a "smoking" experience with reduced health risks as their motivations for purchasing and using these devices.<sup>6</sup> Tobacco use kills more than

eight million people each year, making it one of the biggest public health threats the world has ever faced. Globally, 1.25 billion people use tobacco, with 80% of them living in low- and middle-income countries (LMICs). These countries bear the heaviest burden of tobacco-related illness and deaths.

Vaping was described as a looming crisis threatening the health of children in South Africa. This warning was issued years ago by Prof. Anthony Westwood, a paediatrician at the Red Cross Children's Hospital in Cape Town, concerning the rising prevalence of vaping and e-cigarette use among the nation's youth. Dr. Sharon Nyatsanza, Deputy Director of the National Council Against Smoking, highlighted the significant concern regarding the underage use of e-cigarettes and the high prevalence of vaping among South African youth.

"E-cigarettes pose undeniable health risks; accumulating evidence links their use to serious health conditions such as cancers, respiratory and cardiovascular diseases, chest pains, mouth ulcers, asthma, and an elevated risk of strokes," stated Nyatsanza.

She further noted that young individuals who use e-cigarettes are more likely to transition to regular cigarette smoking and other drug use. With 70% of South African smokers starting before the age of 18, Nyatsanza emphasised that the tobacco industry targets this demographic. She stressed the importance of implementing

public health strategies to prevent early initiation, particularly in Africa, where a significant youth population is emerging.

“Regulation is imperative to safeguard the health of children and the broader population,” Nyatsanza concluded.

In a time when vaping is often linked to stylish designs and a plethora of flavours, the harsh reality is often overlooked. Within the vapours, a blend of harmful chemicals lurks, endangering the respiratory health of those who choose to partake.<sup>7</sup> From arsenic, a component found in rat poison, to acrolein from weedkiller, and xylene commonly used in paint strippers – these are just a few of the perilous substances ingested by users every time they take a puff.<sup>8,9</sup>

Aside from the escalating apprehension regarding the potential health hazards associated with vaping, the desire to quit vaping has also been associated with encountering adverse physical effects (such as dry mouth and cough), the increasing expenses related to vaping, and the necessity to overcome dependence on vaping products.<sup>10,11</sup>

A recent study from the University of Cape Town Lung Institute uncovers a worrying trend: a substantial number of South African students are vaping, with nearly 7 000 reported cases.<sup>12</sup> Rates vary across grades, with 26.5% of Grade 12 students admitting to vaping, slightly decreasing in lower grades to 17.4% in Grade 11, 13% in Grade 10, and 10.8% in Grade 9. These results indicate a rising youth interest in vaping, emphasising concerns about its health effects and the importance of parental awareness. Asanda Gcoyi, CEO of the Vapour Products Association of South Africa (VPASA), attributes the growing popularity of vaping among adolescents to factors such as peer pressure, curiosity for new experiences, social stress, and the availability of vaping products from unregulated sellers and online platforms. A study conducted in 2022 by Prof. Richard van Zyl-Smit from the University of Cape Town involving over 5 500 high school students revealed alarming statistics: three out of ten students use their electronic smoking devices within an hour of waking up, nearly a quarter cannot go through a school day without vaping, and more than one in four matriculants are engaged in vaping.<sup>13</sup>

## Nicotine dependence

Tobacco products contain nicotine, which is the drug that produces dependence in smokers.<sup>14</sup> Nicotine affects the dopaminergic system in the brain, causing a sense of well-being, and also increases the number of nicotinic receptors.<sup>15,16</sup> Nicotine may be as addictive as heroin, cocaine or alcohol, and yet is viewed as the most socially accepted form of chemical dependence.<sup>14</sup> Nicotine withdrawal symptoms, including headaches, coughing, cravings and increased appetite can be a major barrier to smoking cessation.<sup>15</sup> Sudden mood changes, irritability and restlessness may also cause resistance from the support system members or close relatives of the patient trying to quit.<sup>15</sup> Smoking is an addictive habit, with a strong association with emotions and thoughts, but is also intimately linked to the smoker’s daily activities and rituals,

like driving or having meals.<sup>14,15</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 deal with the emotional attachment to smoking.<sup>15</sup>

Vaping products function by heating the e-liquid or e-oil found in cartridges to create an aerosol or vapour, which users then inhale into their lungs. This e-liquid or e-oil may include nicotine, tetrahydrocannabinol (THC), and/or cannabinoid (CBD), as well as various flavourings and additives.<sup>11</sup> The popularity of these devices can be attributed to the abundant flavours these are sold in, ranging from fruity to sweets or even taste like tobacco. The key distinction between smoking conventional cigarettes and vaping lies in the form of inhalation—smoke versus vapour. Smoking involves the ignition of tobacco, delivering nicotine and tar to the lungs through inhaled smoke. Vaping, on the other hand, employs a battery-operated heater, commonly referred to as coils, to heat e-liquid or “e-juice”, producing a vapour that is then inhaled. While both methods deliver nicotine to the lungs, they can lead to addiction and result in severe health issues.<sup>17,18</sup> Most common effects start in the lungs where only a few minutes of vaping can cause changes in how the lung functions and exacerbate inflammation.<sup>19</sup> Respiratory symptoms like coughing, sore throat, and dry mouth have also been documented to surge immediately following vaping.<sup>19</sup> Although much remains unknown about the connection between vaping and the onset of chronic respiratory illness, a recent study tracking a significant cohort of individuals (21 000) over several years unveiled that individuals who engaged in vaping were 30% more prone to developing asthma and 60% more prone to developing chronic obstructive pulmonary disease compared to those who never used e-cigarettes.<sup>19</sup> Linkage between e-cigarette usage and heart disease has demonstrated an ability to elevate blood pressure, heart rate, and arterial stiffness.<sup>20</sup> Although there isn’t enough research to definitively state that vaping causes heart disease, the risk factors associated with it are heightened by e-cigarette use. Consequently, there’s a strong likelihood that vaping negatively impacts heart health. A limited number of studies have indicated that individuals who use e-cigarettes face a greater likelihood of experiencing heart attack, stroke, and angina.<sup>21</sup> While most vapers haven’t engaged in vaping for a duration sufficient to ascertain its potential to induce cancer, laboratory research has revealed that the vapours emitted by e-cigarettes have the capability to harm human DNA, thereby presenting a potential pathway to cancer development.

## Tobacco use in human immunodeficiency virus and tuberculosis

Tobacco use has multiple effects on the immune system, as it affects the circulating immune cells, mucosal surface defences and other immune cell functions, which results in it being a leading cause of respiratory infections.<sup>4</sup> It was found in a recent study that HIV-positive patients who used tobacco products had a significantly increased mortality rate compared to those who had never smoked, doubling the mortality of smokers with HIV.<sup>22</sup>

It is estimated that around 12% of the population in South Africa is living with HIV, with over 1 700 acquired immune deficiency syndrome-related deaths each day.<sup>23</sup>

Smoking cessation has been shown to reduce the risk of bacterial pneumonia and *Pneumocystis pneumonia* in HIV-positive patients by approximately 27%.<sup>24</sup> HIV-positive patients who smoke have a 20 times greater risk of developing tuberculosis than non-smokers who are infected with HIV.<sup>24</sup>

### EVALI incidences and how to recognise it

In 2019, e-cigarette or vaping product use-associated lung injury (EVALI) was officially recognised as a severe pulmonary illness linked to the use of e-cigarettes or vaping products. EVALI was linked to vitamin E acetate (VEA).<sup>25</sup> The majority of individuals diagnosed with EVALI had used THC-containing e-cigarettes, with a significant number of them containing VEA.<sup>26</sup> EVALI is diagnosed based on a combination of clinical features and patient history, with no specific diagnostic test available. The most widely used definition, according to CDC guidance, aims to identify probable and confirmed cases during outbreaks. Confirmed cases are determined by the onset of pulmonary infiltrates on chest X-ray or computed tomography within 90 days of e-cigarette use, with no alternative cause found after medical assessment.<sup>27</sup> EVALI symptoms develop gradually. Lab findings may include elevated white blood cell count and erythrocyte sedimentation rate, though they're often nonspecific.<sup>28</sup> Typically, symptoms appear as respiratory issues with common symptoms like breathlessness, cough, chest pain, and/or bleeding. Additionally, patients may experience gastrointestinal symptoms (nausea, vomiting, and/or diarrhoea) and/or constitutional symptoms (fever, chills, fatigue, and/or weight loss).<sup>27,29</sup> It's important to highlight that e-cigarette use has been linked to up to seven times the likelihood of COVID-19 diagnosis compared to non-users along with an increased risk of COVID-related symptoms.<sup>30,31</sup> Treatment for EVALI often begins with antibiotics, as EVALI-induced respiratory failure can resemble bacterial or viral pneumonia.<sup>32</sup> Supportive oxygen therapy is reportedly administered<sup>33</sup> and most patients receive corticosteroid treatment although those managed without steroids still exhibit rapid clinical improvement.<sup>27,34</sup>

### Nonpharmacological interventions

Nonpharmacological approaches to quitting smoking mostly involve motivational interviews and counselling, but other measures include cognitive behavioural therapy, hypnotherapy and acupuncture or electrostimulation.<sup>3,16</sup> Counselling can be performed in several ways, including telephone or on-line counselling, and group or one-on-one patient counselling.<sup>14,16</sup> This method has shown success when at least three or more sessions were attended, or when the counselling was supported by the use of medication to treat nicotine withdrawal.<sup>3,16</sup>

Cognitive behavioural therapy assists the patient with changing habits associated with smoking, and helps to motivate patients to quit.<sup>16</sup> Hypnotherapy has been proposed as a way of lessening the

desire to smoke and/or improving the will to stop. However, there has been no convincing efficacy data arising from clinical trials to indicate that there is an advantage to be gained from hypnosis for smoking cessation.<sup>3,16</sup>

Acupuncture and electrostimulation are promoted to aid in smoking cessation by reducing withdrawal symptoms.<sup>3,16</sup> Benefit with respect to the number of people who successfully quit smoking has not been demonstrated in review studies that have compared these therapies to placebo.<sup>3,16</sup>

While established guidelines for effectively managing the cessation of cigarettes exists,<sup>35</sup> there is a notable absence of evidence-based recommendations to support electronic cigarette (EC) users looking to quit vaping. It remains uncertain whether guidelines designed for smoking cessation can be applied to vaping products. Notably, there is a lack of studies evaluating the effectiveness of medications approved by the US Food and Drug Administration (FDA) for smoking cessation in aiding vaping cessation. The efficacy and safety of varenicline for vaping cessation have not undergone examination, emphasising the need for comprehensive research to inform the decisions of health authorities and healthcare providers.

The new article published by the WHO Article 14 on the 8th of July 2024 as guidelines as basic infrastructure needed to promote tobacco cessation and provide effective tobacco dependence treatment said the following in regards to vaping cessation: *"This guideline provides recommendations for supporting adults (individuals aged 18 years and older) to quit the use of any types of tobacco products, including: cigarettes, waterpipe (hookah, shisha) tobacco, various smokeless tobacco products, cigars, cigarillos, roll-your-own tobacco, pipe tobacco, bidis, kreteks and heated tobacco products. E-cigarettes are beyond the scope of this guideline because the potential benefits and harms of using these products are complex and are addressed in a separate body of literature. These products may be addressed in the future as evidence accumulates."* This again calls to attention the importance of more studies to be done.

Children are recognised as being susceptible to nicotine addiction, as highlighted by Murthy and the WHO.<sup>36,37</sup> Due to the potent addictive nature of nicotine products, a considerable percentage of early experiments with these products tend to escalate into habitual, addictive use. The probability of developing addiction is partly influenced by age, with adolescents under 15 years who engage in smoking having an estimated 50% chance of developing nicotine addiction. The risk of addiction further increases with prolonged and repeated smoking.<sup>21</sup> Notably, the majority of tobacco addictions take root before the age of 21 years.<sup>12,38</sup>

### The role of the pharmacist

In a study done in 2021 in South Africa, with over 18 208 smokers, researchers determined that of those planning to use any cessation aid were interested in getting help from a pharmacist was 44.6%.<sup>39</sup> This highlights the importance for pharmacists to not

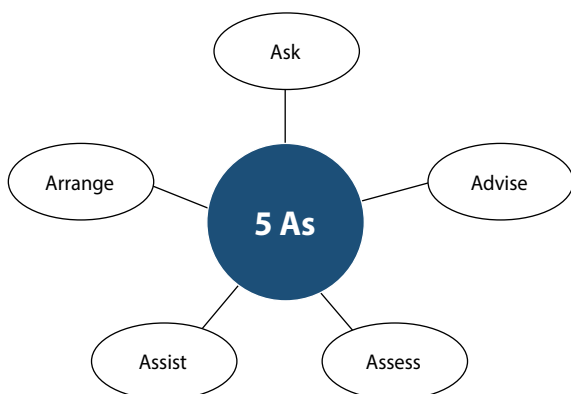
only know pharmacotherapy but also nonpharmacological advice to assist and advise patients.

### Identifying the patient

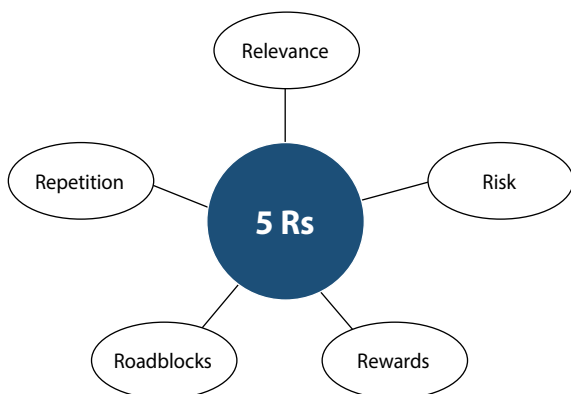
When patients present to primary care facilities and need to have their vital signs assessed, they can be asked whether or not they smoke.<sup>3</sup> Encouragement and assistance provided by members of the multidisciplinary healthcare team increases the likelihood of abstinence.<sup>3</sup> According to the WHO<sup>15</sup> toolkit for brief tobacco interventions, the primary healthcare provider can use the “5 As” (Figure 1) to help to identify patients who are ready to quit. The process can also be used to determine which patients are not prepared to stop smoking, or who think that it is not important to do so.<sup>15</sup> The “5 Rs” model (Figure 2) can be used for the latter patients using a motivational counselling intervention to prepare them to change their minds about smoking cessation.<sup>15</sup>

The 5 As model can assist in identifying patients who are ready to quit and assist them with advice about tobacco use:<sup>15</sup>

- **Ask:** By asking about their use of tobacco, all smokers visiting the healthcare facility will be systematically identified.<sup>15</sup> Enquiries should be made in a friendly, non-accusing way, and tobacco use indicated on the medical notes.<sup>15</sup>



**Figure 1:** The 5 As intervention process, to be used in patients who are ready to cease smoking<sup>15</sup>



**Figure 2:** The 5 Rs motivation intervention process, to be used in patients who are not ready to quit smoking<sup>15</sup>

- **Advise:** The advice given should be tailored to the specific patient, must be clear and strong, and aimed at persuading the patient to quit.<sup>15</sup>
- **Assess:** An assessment is undertaken to determine the willingness of the patient to make an attempt to quit.<sup>15</sup>
- **Assist:** This refers to the actions of the healthcare worker with regard to supporting the patient and helping him or her to develop a specific plan to quit, as well as providing support and recommendations on the use of medication.<sup>15</sup>
- **Arrange:** Arranging or planning a follow-up visit or contact with the patient, either in person or by telephone, is important.<sup>15</sup>

The 5 Rs model can be used as a motivational intervention tool to assist patients who are not ready to quit:<sup>15</sup>

- **Relevance:** It is important demonstrate to the patient how quitting would be personally relevant to him or her.<sup>15</sup>
- **Risks:** Highlighting the risks associated with smoking encourages the patient to understand the potentially negative consequences of tobacco use which are relevant to him or her.<sup>15</sup> These risks may include cardiovascular threats, like myocardial infarction (MI) and strokes, and other illnesses such as lung cancer and COPD. Risks also include the threat to wealth or the ensuing financial burden.<sup>15</sup>
- **Rewards:** The patient must be made aware of the potential benefits of stopping tobacco use, for example having improved health and sense of smell and taste, saving money and a general improvement in their well-being.<sup>15</sup>
- **Roadblocks:** It is important to identify barriers that prevent patients from quitting tobacco products, and to provide advice on treatment options that will address these, i.e. withdrawal symptoms, weight gain, depression and the negative presence of other tobacco users.<sup>15</sup>
- **Repetition:** Repetition is indicated if the patient is still not prepared to stop smoking. If this is the case, at a later stage, he or she should be re-assessed for his or her readiness to quit and the intervention repeated.<sup>15</sup>

Identifying patients who are ready to quit smoking and motivational measures to assist patients to quit smoking are every healthcare provider’s responsibility.<sup>40</sup> Motivational interviewing is an evidence-based approach to assisting patients to change their tobacco habits.<sup>40</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 one alone.<sup>14</sup> Table I outlines key patient advice for initiating non-pharmacological smoking and vaping cessation management.

### Pharmacological interventions

There is substantial evidence supporting the effectiveness of pharmacological support for smoking cessation with multiple evidence-based guidelines available to inform its use.<sup>47-49</sup> However, when searching for vaping cessation guidelines, few

**Table I:** Patient advice when initiating non-pharmacological smoking/vaping cessation management<sup>41-46</sup>

Patient advice	Pharmacist has foundational knowledge? (✓ or ✗)
Assess willingness to make a cessation attempt – Is the patient willing to make a cessation attempt at this time? <b>Advise to quit</b> in a strong, urgent manner. The intervention should <b>focus</b> on the <b>advantages of smoking cessation for health</b> rather than on the risks of smoking.	<input type="checkbox"/>
<b>Gradually reducing smoking</b> without medication often leads to <b>persistent cravings and prolonged withdrawal symptoms</b> . Smokers tend to compensate by increasing their puffing frequency or intensity. Therefore, it's advised to <b>quit smoking altogether</b> .	<input type="checkbox"/>
Advise patients to <b>seek counselling</b> for regular follow-ups, whether with a physician or psychologist. If the patient, due to financial strain or work hours can't, it is important to instruct the patient in selecting cognitive and behavioural coping strategies for managing nicotine cravings. <b>Cognitive coping skills</b> may involve reminding the patient of their motivations for quitting, reassuring them that the urge will diminish, and repeating affirmations such as "smoking is not an option". <b>Behavioural coping techniques</b> may include removing oneself from the triggering situation, engaging in distracting activities, practising deep breathing exercises, and seeking support from others.	<input type="checkbox"/>
Advise patients to <b>develop support-seeking skills</b> , such as asking for help from family, friends, and coworkers, and creating a smoke-free home. They should also encourage prompt support-seeking by assisting patients in identifying supportive individuals and informing them about community resources like hotlines. <b>South African Quit line: 011 720 3145 and Whatsapp number: 072 766 7812</b>	<input type="checkbox"/>
Use the <b>STAR-method</b> for initiating cessation. 1) <b>Choose a date</b> to begin the journey toward quitting. 2) <b>Share the decision</b> to quit smoking with family, friends, and coworkers, seeking their understanding and support. 3) <b>Prepare for potential obstacles</b> during the initial weeks of quitting, including managing nicotine withdrawal symptoms (e.g. mood disturbance, insomnia, irritability, difficulty concentrating, increased appetite and weight gain). 4) <b>Remove tobacco products</b> from surroundings and avoid smoking in commonly visited areas like home, work, and the car before quitting.	<input type="checkbox"/>

were identified. Some guidance and recommendations that were developed to support smoking cessation generally state that recommendations are inclusive of electronic nicotine delivery systems (ENDS) and other vaping products and despite the lack of evidence, it may be reasonable to manage vaping cessation in a way similar to smoking cessation.<sup>50-51</sup> The available literature and data highlight a gap in knowledge concerning the effectiveness of pharmacotherapy and other interventions for supporting vaping cessation.<sup>51</sup>

Pharmacological therapy should be instituted in conjunction with cognitive behavioural and supportive therapy. Table II lists the therapeutic options that are currently, or soon to be, available.

### Nicotine replacement therapy

Nicotine has a relatively short half-life and is not well absorbed.<sup>3,54,55</sup> For this reason, some of the preparations should be taken 1–2 hourly (sublingual tablets) and the patches replaced daily.<sup>3,54,55</sup> When used in conjunction with professional counselling and supportive therapy, the likelihood of reducing the addiction more than doubles.<sup>3,54,55</sup> When used on its own, the chances of cessation of smoking resulting are the same as that of placebo.<sup>3,54,55</sup> Side-effects of these agents include nausea and gastrointestinal cramps, coughing, insomnia and muscle pain. Nicotine may cause coronary spasms in patients with cardiac conditions such as MI, an acute stroke, cardiac arrhythmias and angina, i.e. the stable, unstable or Prinzmetal's variants. Patches might cause local irritation to the skin.<sup>3,54,55</sup> The use of nicotine replacement therapy has been shown to be more effective when combined with a dopamine reuptake inhibitor, such as bupropion.<sup>3,54,55</sup>

### Antidepressants

Bupropion hydrochloride which is initially taken as 150 mg daily for three days, then increased to 150 mg twice daily, may be used with nicotine replacement therapy, or on its own. Bupropion lowers the seizure threshold, and patients at risk of seizures should use an alternative option. It should also not be administered to patients with a current or previous diagnosis of an eating, or bipolar mood, disorder.<sup>3,54</sup>

Nortriptyline is an active metabolite of amitriptyline, and although not currently registered in South Africa, it is used elsewhere in patients who have failed nicotine replacement therapy, and bupropion and varenicline.<sup>3,54</sup>

### Nicotine receptor partial agonists

Varenicline is available in South Africa, and should be used in combination with cognitive behavioural therapy.<sup>3,56</sup> Reports of an increase in suicide or suicidal behaviour have been noted in patients taking this drug.<sup>3,56</sup> Therefore, when patients are initiated on this agent, they should be monitored for any behavioural or neuropsychiatric changes.<sup>57</sup> Cytisine and dianicline are currently being used, but are not yet available in South Africa.<sup>3,56</sup> These agents act as partial agonists of the central, high-affinity,  $\alpha 4\beta 2$ -containing, nicotinic acetylcholine receptors (nAChRs).<sup>58</sup> This should relieve withdrawal symptoms and cravings in individuals when they attempt to stop smoking by activating the  $\alpha 4\beta 2$  nAChRs and competing for the nicotine at its binding site.<sup>58</sup>

Table II: Pharmacological treatment options for smoking cessation <sup>52-57</sup>			
Pharmacological therapy	Mechanism of action	Availability	Prescribing points and additional information
<b>Nicotine replacement therapy (NRT)</b>			
Nicotine transdermal patches	Nicotine binds stereo-selectively to nicotinic-cholinergic receptors (nAChR) at the autonomic ganglia in the adrenal medulla, at neuromuscular junctions, and in the brain.  Stimulating effect: exerted mainly in the cortex via locus ceruleus and a reward effect is exerted in the limbic system. At low doses the stimulate effects predominate while at high doses the reward effects predominate.	OTC	Available in 3 strengths (35–52.5 mg) Applied daily for up to 24 hours Therapy starts with 52.5 mg for heavy smokers (> 20 cigarettes/day) and 35 mg for lighter smokers (< 20 cigarettes/day) Max duration of treatment: 3 months Reduce dosage every 3–4 weeks Dosage cannot be adjusted by cutting the plaster
Nicotine Gum	See above	OTC	2–4 mg chewed slowly when the urge to smoke arises Chew for 30 minutes to release the majority of nicotine; stop chewing as soon as the gum flavour is noticeable; once the taste or tingling diminishes, resume slow chewing of the gum; stop chewing again when the taste becomes stronger Maximum: 15 pieces per day Max treatment duration: 3 months Gradually reduce gum use until down to 1–2 pieces per day before stopping
Nicotine inhaler	See above	OTC	0.66–1 mg per spray, whenever there is an urge to smoke 4 strengths available Therapy starts with 1 mg if smoking > 20 cigarettes/day or 0.66 mg if smoking < 20 cigarettes/day Maximum: 60 sprays/day (1 mg) or 90 sprays/day (0.66 mg) Reduce dosage every 3–4 weeks Complete smoking cessation (all forms) required during treatment
<b>Antidepressants</b>			
Bupropion	Selective inhibitor of the neuronal re-uptake of catecholamines (noradrenaline and dopamine) with minimal effect on the re-uptake of indolamines (serotonin) and does not inhibit monoamine oxidase.  The mechanism by which bupropion enhances the ability of the patient to abstain from smoking is unknown.	Prescription	Oral (SR tablet): Initial: 150 mg daily; increase to 150 mg twice daily on day 7 Max single dose: 150 mg Max 300 mg/day Start while still smoking; set a “target stop date” within first 2 weeks, ideally within 2 <sup>nd</sup> week Treatment for 7–9 weeks; discontinue if no improvement by week 7 Avoid bedtime dosing to reduce insomnia Food-drug interaction: be cautious when taking bupropion hydrochloride with a high-fat meal, as it may increase exposure to the medication
<b>Nicotine receptor partial agonists</b>			
Varenicline	Binds with high affinity and selectivity at alpha-4 beta-2 neuronal nicotinic acetylcholine receptors (nAChR), where it acts as a partial agonist. It has both agonist activity, with lower intrinsic efficacy than nicotine, and antagonist activities in the presence of nicotine.  Nicotine competes for the same human $\alpha 4\beta 2$ nAChR binding site for which varenicline has higher affinity. Therefore, varenicline can effectively block nicotine’s ability to fully activate $\alpha 4\beta 2$ receptors and the mesolimbic dopamine system, the neuronal mechanism underlying reinforcement and reward experienced upon smoking.	Prescription	Oral: day 1–3: 0.5 mg daily; days 4–7: 0.5 mg twice daily; day 8 onwards: 1 mg twice daily Treatment duration: 12 weeks; extendable by another 12 weeks if successful Patients should set a quit date 1–2 weeks before starting Consider dose reduction to 0.5 mg twice daily if adverse effects occur After smoking cessation therapy, the risk of relapse is higher immediately post-treatment. For high-risk patients, dose tapering may be considered Motivated patients who didn’t quit or relapsed during varenicline therapy may find another attempt with varenicline beneficial
<b>Nicotine vaccine</b>			
Nicotine vaccine	Induces antibodies that bind to nicotine, preventing it from binding to central receptors	Not yet available	–

## Conclusion

The desire to quit smoking is paramount to the successful execution of a smoking cessation programme. Potential patients need to be identified during routine primary care practices. Those who want to quit can be initiated on the 5 As model, while those that are not yet ready to do so can be assisted through the 5 Rs model. Successful smoking cessation requires a combination of behavioural therapy, social support and the appropriate use of relevant pharmacotherapeutic interventions. Research on vaping is still scant, even though these devices have been on the market for quite some time, with usage surging from as early as 2003. Preliminary studies are beginning to emerge, indicating that vaping, like smoking, may have serious health repercussions. The urgency on closing the knowledge gap on vaping cessation is definite and more research and studies to determine long-term use effects should be a priority. Research and quality checks on the ingredients inside e-juices and vapes also need to be investigated. Currently with no tailor specific treatment for vaping, pharmacological and non-pharmacological treatment is the same as cigarette cessation. Amidst the worsening vaping lung injury crisis, new smoking alternatives continue to emerge. One such alternative is a salt-based formulation. Vaping, akin to a modern siren, entices many youths and cigarette smokers trying to quit and find themselves unable to shake the addiction.

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