South African Family Practice 2015; 57(1):39-42

S Afr Fam Pract
ISSN 1608-4356 EISSN 1727-9835

REVIEW

Smoking cessation

N Schellack[a]* and Bronkhorst E[a]

[a]Department of Pharmacy, Faculty of Health Sciences, Sefako Makgatho Health Sciences University
**Corresponding author: Natalie Schellack, e-mail: natalie.schellack@smu.ac.za*

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 8 million smokers in the country. Smoking has been associated with detrimental heath 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. This article aims to provide an overview of the importance of smoking cessation, and the nonpharmacological and pharmacological measures aimed at ensuring that smokers quit.

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

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.[1] Although smoking rates have declined by 32% since 1993, there are still an estimated 8 million (16.4%) smokers in South Africa.[2] South Africa has a particularly high prevalence of smoking compared to the rest of the world.[3] The effects of smoking are exacerbated by the infectious risk factors of chronic obstructive pulmonary disease (COPD), tuberculosis and human immunodeficiency virus (HIV), of which South Africa has one of the highest burdens globally.[3] The mortality rate for current smokers in South Africa is nearly double that of non- or ex-smokers.[4] 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.[3]

Although tobacco use is a leading cause of morbidity and mortality in adults, it can be viewed as a disease that starts in adolescence. More than half of all new smokers have their first cigarette before the age of 18 years.[5] The vast majority (99%) of adult smokers started using tobacco before the age of 26 years.[5] It may be worthwhile targeting this population group when developing smoking cessation strategies.

Nicotine dependence

Tobacco products contain nicotine, which is the drug that produces dependence in smokers.[6] Nicotine affects the dopaminergic system in the brain, causing a sense of well-being, and also increases the number of nicotinic receptors.[7,8] Nicotine may be as addictive as heroin, cocaine or alcohol, and yet is viewed as the most socially accepted form of chemical dependence.[6] Nicotine withdrawal symptoms, including headaches, coughing, cravings and increased appetite, can be a major barrier to smoking cessation.[7] Sudden mood changes, irritability and restlessness may also cause resistance from the support system members or close relatives of patients trying to quit.[7] 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.[6,7] For this reason, it is important to deal with the patient's physical nicotine dependence, but also to introduce cognitive behavioural therapy to deal with his or her emotional attachment to smoking.[7]

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. Thus, it is a leading cause of respiratory infections.[4] It was found in a recent study[9] 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. It is estimated that approximately 12% of the population in South Africa is living with HIV, with over 1 700 acquired immune deficiency syndrome-related deaths each day.[10]

Smoking cessation has been shown to reduce the risk of bacterial pneumonia and *Pneumocystis* pneumonia in HIV-positive patients by approximately 27%.[11] HIV-positive patients who

smoke have a 20 times greater risk of developing tuberculosis than non-smokers who are infected with HIV.[11]

Nonpharmacological interventions

Nonpharmacological approaches to quitting smoking mostly involve motivational interviews and counselling, but other measures include cognitive behavioural therapy, hypnotherapy, acupuncture and electrostimulation.[3,8] Counselling can be performed in several ways, including telephonic or on-line counselling, and group or one-on-one patient counselling.[6,8] Success has been demonstrated through the use of this method when at least three or more sessions were attended, or when the counselling was supported by the use of medication to treat nicotine withdrawal.[3,8]

Cognitive behavioural therapy assists patients to change the habits associated with smoking, and helps to motivate them to quit.[8] Hypnotherapy has been proposed as a way of lessening the desire to smoke and/or improving the will to stop. However, there is a lack of convincing efficacy data from clinical trials to indicate that there is an advantage to be gained from hypnosis for smoking cessation.[3,8]

Acupuncture and electrostimulation are promoted to aid in smoking cessation by reducing withdrawal symptoms.[3,8] Benefit was not demonstrated with regard to the number of people who successfully stopped smoking in review studies in which these therapies were compared to placebo.[3,8]

The aforementioned parameters can be instituted in patients after they have been identified.

Identifying the patient

When patients present to primary care facilities and have their vital signs assessed, they should be asked whether or not they smoke.[3] Encouragement and assistance provided by members of the multidisciplinary healthcare team increases the likelihood of abstinence.[3] According to the WHO[7] toolkit on 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 patients who are not prepared to stop smoking, or who not think that it is not important to do so.[7] The 5 Rs model (Figure 2), a motivational counselling intervention, can be used to prepare these latter patients to change their minds about smoking cessation.[7]

The 5 As model can assist in identifying patients who are ready to quit smoking and assist them with advice on tobacco use:[7]

- *Ask:* By asking about their use of tobacco, smokers visiting a healthcare facility can be systematically identified.[7] Enquiries should be made in a friendly, non-accusing way, and tobacco use indicated on the medical notes.[7]
- *Advise:* The advice given should be tailored to the specific patient, must be clear and strong, and aimed at persuading the patient to quit.[7]
- *Assess:* An assessment must be undertaken to determine the willingness of the patient to make an attempt to quit.[7]
- *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.[7]
- *Arrange:* Arranging or planning a follow-up visit or contact with the patient, either in person or by telephone,[7] is necessary.

The 5 Rs model can be used as a motivational intervention tool to assist patients who are not ready to quit:[7]

- *Relevance:* It is important to demonstrate to the patient how quitting would be personally relevant to him or her.[7]
- *Risks:* Highlighting the risks associated with smoking encourages the patient to understand the potentially negative consequences of tobacco use that are relevant to him or her.[7] 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.[7]
- *Rewards:* The patient must be made aware of the potential benefits of stopping tobacco use, for example having improved health and regaining an improved sense of smell and taste, saving money and experiencing general improvement in his or her well-being.[7]

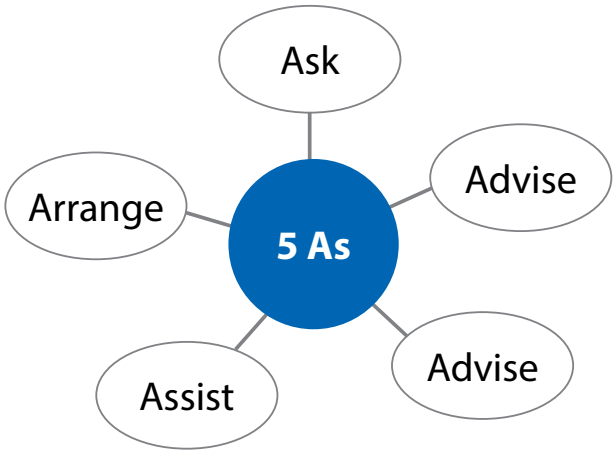

Figure 1: The 5 As intervention process, to be used in patients who are ready to cease smoking[7]

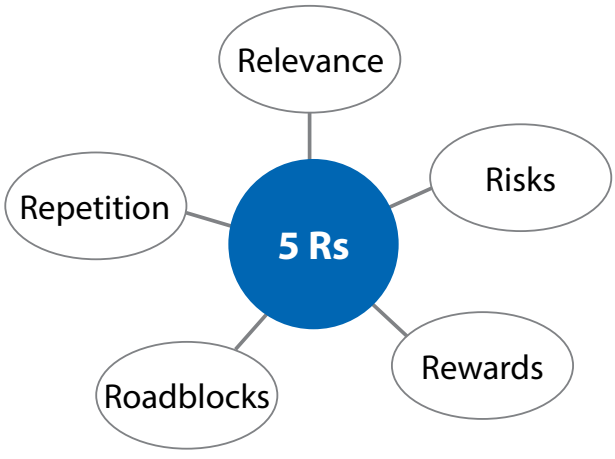

Figure 2: The 5 Rs motivation intervention process, to be used in patients who are not ready to quit smoking[7]

- *Roadblocks:* It is important to identify barriers that are preventing the patient from quitting tobacco products, i.e. withdrawal symptoms, weight gain, depression and being in the company of other tobacco users, and to provide advice on treatment options that will address these.[7]
- *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.[7]

Identifying patients who are ready to quit smoking and providing motivational measures to assist patients to quit smoking are every healthcare provider's responsibility.[12] Motivational interviewing is an evidence-based approach to assisting patients to change their tobacco habits.[12] 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 alone.[6]

Pharmacological interventions

Pharmacological therapy should be instituted in conjunction with cognitive behavioural and supportive therapy. Table I lists the therapeutic options that are currently available, or that will soon be available (Table I).[3,13-16]

Nicotine replacement therapy

Nicotine has a relatively short half-life and is not well absorbed.[3,13,14] For this reason, some of the preparations should be taken 1-2 hourly (sublingual tablets) and the patches replaced daily.[3,13,14] When used in conjunction with professional counselling and supportive therapy, the likelihood of reducing the addiction more than doubles.[3,13,14] When used on its own, the chances of the patient quitting successfully are the same as that of placebo.[3,13,14] The 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.[3,13,14] The use of nicotine replacement therapy has been shown to be more effective when combined with a dopamine reuptake inhibitor, such as bupropion.[3,13,14]

Table I: Pharmacological therapy for smoking cessation

Pharmacological therapy	Mechanism of action
Nicotine replacement therapy	
Nicotine transdermal patches Nicotine gum and lozenges Nicotine tablets Nicotine inhalers	To partially provide nicotine that would otherwise be ingested from cigarettes, which acts by relieving the psychological and physical withdrawal syndrome.
Antidepressants	
Bupropion	Increases dopamine activity in the nucleus accumbens by acting as a reuptake inhibitor of dopamine. It is also a weak uptake inhibitor of both serotonin and noradrenaline.
Nicotine receptor partial agonists	
Varenicline	Acts as a partial agonist of nicotinic acetylcholine receptors, thereby maintaining moderate levels of dopamine to counteract the withdrawal symptoms.
Nicotine vaccine Not yet available	Induces antibodies that bind to nicotine, thereby reducing the availability of nicotine that can bind to the central receptors.

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.[3,13]

Nortriptyline is an active metabolite of amitriptyline, and although not currently registered in South Africa, is used elsewhere in patients who have failed using nicotine replacement therapy, and failed using bupropion and varenicline.[3,13]

Nicotine receptor partial agonists

Varenicline is available in South Africa, and should be used in combination with cognitive behavioural therapy.[3,15] Reports of an increase in suicide or suicidal behaviour have been noted in patients taking this drug.[3,15] Therefore, when patients are initiated on this agent, they should be monitored for any behavioural or neuropsychiatric changes.[16] Cytisine and dianicline are currently being used, but are not yet available in South Africa.[3,15] These agents act as partial agonists of the central, high-affinity, α4β2-containing, nicotinic acetylcholine receptors (nAChRs).[17] Withdrawal symptoms and cravings in individuals should be relieved when they attempt to stop smoking through activation of the α4β2 nAChRs and through competition for the nicotine at its binding site.[17]

Nicotine vaccines

Available evidence does not support the idea that nicotine vaccines will enhance long-term smoking cessation.[18] At the time of publication, a vaccine had not yet been licensed in South Africa, but its development is ongoing in other countries.[18]

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 wish to quit can be initiated on the 5 As model, while those who 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.

References

1. Reddy P, James S, Sewpaul R, et al. A decade of tobacco control: the South African case of politics, health policy, health promotion and behaviour change. S Afr Med J. 2013;103(11):835-840.
2. Human Sciences Research Council. Results of first South African national health and nutrition survey released. HSRC [homepage on the Internet]. 2013. Available from: http://www.hsrc.ac.za/en/media-briefs/population-health/results-sanhanes1#sthash.DeE45Rkj.dpuf
3. Van Zyl-Smit RN, Allwood B, Stickells D, et al. South African tobacco smoking cessation clinical practice guideline. S Afr Med J. 2013;103(11):869-876.
4. Van Zyl-Smit RN, Pai M, Yew WW, et al. Global lung health: the colliding epidemics of tuberculosis, tobacco smoking, HIV and COPD. Eur Respir J. 2010;35(1):27-33.
5. Adelman W, Myhre KE. Motivational interviewing: helping teenaged smokers to quit. Contemporary Pediatrics [homepage on the Internet]. 2013. Available from: http://contemporarypediatrics.modernmedicine.com/contemporary-pediatrics/content/tags/adolescent-smoker/motivational-interviewing-helping-teenaged-sm?page=full
6. Centers for Disease Control and Prevention. Quitting smoking. CDC [homepage on the Internet]. 2014. c2015. Available from: http://www.cdc.gov/tobacco/data_statistics/fact-sheets/cessation/quitting/
7. World Health Organization. WHO toolkit for delivering the 5As and 5Rs: brief tobacco interventions in primary care. Geneva: WHO, 2012.
8. Vachani C. Smoking cessation aids. OncoLink [homepage on the Internet]. 2009. c2015. Available from: http://www.oncolink.org/resources/article.cfm?id=922
9. Lifson A, Niehaus J, Ambas JR, et al. Smoking-related health risk among person with HIV in the Strategies for Management of Antiretroviral Therapy clinical trial. Am J Public Health. 2010;100(10):1896-1903.
10. Chichoki M. HIV Around the World: South Africa. About.com [homepage on the Internet]. 2014. c2015. Available at: http://aids.about.com/od/clinicaltrials/a/safrica.htm
11. Petrosillo N, Cicalini S. Smoking and HIV: time for a change? BMC Medicine. 2013;11:16.
12. Herie M, Selby P. Getting beyond "Now is not a good time to quit smoking": increasing motivation to stop smoking. Ottawa Model for Smoking: Cessation Smoking Cessation Rounds [homepage on the Internet]. 2007. Available from: http://ottawamodel.ottawaheart.ca/sites/ottawamodel.ottawaheart.ca/files/omsc/docs/3.increasingmotivationtostopsmoking.pdf
13. Rossiter D, editor. South African medicine formulary. 10th ed. Cape Town: Health and Publishing Medical Group, 2014.
14. Stead LF, Perera R, Bullen C, et al. Nicotine replacement therapy for smoking cessation. Cochrane review. In: The Cochrane Library, Issue 11, 2012, Oxford: Update Software.
15. Cahill K, Stead LF, Lancaster T. Nicotine receptor partial agonists for smoking cessation. Cochrane review. In: The Cochrane Library, Issue 4, 2012. Oxford: Update Software.
16. Hemmingsson T, Kriebel D. Smoking at age 18-20 and suicide during 26 years of follow up: how can the association be explained? Int J Epidemiol. 2003;32(6):1000-1004.
17. Rollema H, Shrikhande A, Ward KM, et al. Pre-clinical properties of the alpha4beta2 nicotinic acetylcholine receptor partial agonist's varenicline, cytisine and dianicline translate to clinical efficacy for nicotine dependence. Br J Pharmacol. 2010;160(2):334-345.
18. Harmann-Boyce J, Cahill K, Hatsukami D, Cornuz J. Nicotine vaccines for smoking cessation. Cochrane review. In: The Cochrane Library, Issue 8, 2012. Oxford: Update Software.