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Community Medicine

TYPES OF NICOTINE REPLACEMENT THERAPY; A REVIEW

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ABSTRACT The increasing rates of tobacco smoking worldwide means there will be an increase in morbidity, mortality and annual costs to health systems. Effective interventions are needed in order to protect public health and prevent or reduce the burden of smoking. Some smoking cessation policies and interventions have helped with reducing the percentage of smokers in some countries. Pure nicotine products used in medicine (so-called Nicotine Replacement Therapy) have helped with limiting exposure to the toxic chemical substances encountered via tobacco smoking. Different types of Nicotine Replacement Therapy help in protecting public health and preventing the negative health effects of smoking. These interventions need to be improved in order to reduce the global trends of tobacco smoking and the costs to health systems.

KEYWORDS : Nicotine replacement therapy, NRT, nicotine products, nicotine types, smoking cessation

INTRODUCTION

Nicotine replacement therapy (NRT) is a group of products that contain low levels of pure nicotine, but without carbon monoxide, tar, and other poisonous and carcinogenic substances. NRT, also called nicotine-containing products (NCPs), works as a medium that transfers the nicotine into the bloodstream instead of tobacco cigarettes (NHS 2014). Based on the Cochrane library, a systematic review of 150 trials on NCPs carried out by Stead et al. (2012), has shown that the use of NRT can help in increasing the success rate of quitting by 50% to 70%. It is stated that NRT is one of the main interventions for smoking cessation (Stead et al. 2012). The NICE (2013) recommends the use of NRT for all adults who want to quit.

A nicotine chewing gum was the first form of NCPs developed by Ove Fernö in the 1970s (FDA 2015). The US FDA approved this product in 1984 and stated that it was safe, effective, and would help control withdrawal symptoms in people who abruptly quit smoking. The other forms of NRT came later in the 1990s and in the first decade of the 21st century, and have been considered among the first-line of licensed medicines for assistance in the cessation of smoking in Europe and the USA (US Public Health Service 2000; WHO 2013).

However, the NICE (2008) guidance regarding stop smoking services recommends that health care professionals prescribe only one of three medicines (NRT, bupropion, and varenicline) for people who want to stop smoking in addition to providing advice, encouragement, support, and referring them to a smoking cessation service. NRT is one of the most efficient medications used when quitting smoking since it increases the chances of lasting restraint in comparison with placebos or no treatment (Stead et al. 2012). NRT assists in lowering the withdrawal symptoms that are stimulated due to quitting smoking, by providing nicotine to the body through methods other than tobacco. It is estimated that NRT helps in reducing the urge to smoke (craving) and in cutting down the number of consumed tobacco cigarettes (NHS 2014). The 18th WHO Model List of Essential Medicines (2013) included nicotine replacement products, considering such products to be essential treatments for smoking cessation that need to be available in any basic health system.

Skin patches (delivering nicotine to the brain slowly) chewing gums, nasal and oral sprays, lozenges, and inhalers (delivering nicotine to the brain faster than skin patches but slower than cigarettes) are all forms of licensed NRT that have been made accessible to smokers who want to quit smoking (Stead et al. 2012). An electronic cigarette is also a type of nicotine-containing products, but is still unlicensed (NICE 2013). The differences among these forms of NRT will be discussed below.

TYPES OF NICOTINE REPLACEMENT THERAPY:

1) Nicotine Chewing Gum

Nicotine gum is the first type of NRT that works on delivering nicotine to the bloodstream when it is absorbed by the mucous tissues of the mouth. It comes in different flavours and has a range of strengths between 1 and 4 mg (Benowitz et al. 1987). As with many nicotine-containing products, nicotine gum is used along with a smoking cessation program to reduce the effects of withdrawals when stopping smoking to decrease the urge to smoke; however, the mucous tissues in the mouth absorb about 50 percent of the nicotine when chewing nicotine gum and even less when acidic beverages (e.g. fruit juices, beer, and soda) are used 15 minutes prior to chewing the gum (Berrettini 2005). This leads to a low level of nicotine in the blood, in comparison to smoking tobacco, and, therefore, may not help in reducing the urge to smoke. Furthermore, because of the inappropriate use of nicotine gum and some usual side effects such as jaw and stomach discomfort, the gum may not provide the best results (MedlinePlus 2013).

2) Nicotine Lozenge

A nicotine lozenge is a hard tablet that contains nicotine at low levels. The absorption of lozenges by the mucous membrane of the mouth is higher than the absorption of the chewing gum. The lozenge comes in two strengths: 4 mg for people who smoke within a half hour of waking up, and 2 mg for people who smoke after a half hour of waking up (American Cancer Society 2016). As a part of NRT, the lozenge reduces cravings for smoking and the withdrawal symptoms. It is estimated that the lozenge has similar positive effects in smoking cessation as those in the nicotine gum; however, the lozenge has a number of possible side effects such as heartburn, sore throat, and hiccups (Pack et al. 2008; American Cancer Society 2016).

3) Nicotine Patch

A nicotine transdermal patch is a type of NRT that works by delivering nicotine to the bloodstream through the application of a patch to the skin (WebMD 2014). It is applied on a dry, hairless, clean area of the skin. The patch is used once a day and is put on the skin for a period of 16 to 24 hours. The 24-hour patch shows better results in reducing the urge to smoke throughout the day (American Cancer Society 2016). A Cochrane review stated that the nicotine patch can almost double the success rates of quitting smoking when compared with placebos (Stead et al. 2012). In contrast, a randomised controlled trial showed no significant evidence of stopping smoking when using the patch whilst behavioural intervention showed a doubled success rate when compared with the patch (Stotts et al. 2003). The use of the patch may help light smokers quit smoking, but heavy smokers need to combine the patch with another NRT method to receive the best results (Stead et al. 2012).

4) Nicotine Inhaler

A nicotine inhaler is a plastic cigarette-like device. It delivers nicotine to the body by absorbing the vapour of the inhaler into the

mucous tissues of the mouth. Most of the vapour does not go to the lungs, but it can still satisfy the oral urge to smoke; however, the inhaler might cause mouth irritation and coughs in some users. In the USA, inhalers are the most expensive type of nicotine-containing products and require a prescription, unlike other types of NRT such as nicotine gum, lozenges, and patches (MedlinePlus 2013).

5) Nicotine Nasal Spray

The nasal spray contains nicotine and works as a spray that delivers the nicotine into the bloodstream through the tissues of the nose (MedlinePlus 2013). The absorption of this spray is quicker than the above types of NRT. This rapid absorption was estimated to help stop the urge to smoke tobacco and to relieve the withdrawal symptoms when a person is trying to stop smoking. However, nasal sprays can have undesirable side effects due to local negative effects of the spray on the nasal mucosa, in spite of their documented efficacy (Kraiczi et al. 2011).

6) Nicotine Mouth Spray

The nicotine mouth spray (NMS) is the newest form of licensed NRT. It has been on the market since 2010. When a person uses the NMS, the liquid of the spray is absorbed quickly through the lining of the mouth into the bloodstream. Each metered dose of the NMS contains 1 mg of nicotine (MHRA 2015). The nicotine sprays are considered to be the fastest acting types of NRT (NHS 2014). It is estimated that the NMS can deliver blood nicotine levels to maximal blood concentrations in approximately ten minutes, faster than nicotine gum and nicotine lozenges (Kraiczi et al. 2011). Therefore, some people prefer to use these sprays as they rapidly stop cravings in people who find stopping smoking difficult due to the urge to smoke after quitting. The mouth spray also relieves the withdrawal symptoms for people who are trying to quit smoking (Kraiczi et al. 2011). Furthermore, there is evidence that the NMS can help with quitting smoking long term (Tønnesen et al. 2012). The NICE (2013) has recommended smoking cessation advisers to offer a combination of a nicotine intradermal patch and a rapid-acting form of NRT including the NMS for everyone who wants to quit smoking. However, when acidic beverages are used up to 15 minutes prior to the use of the nicotine mouth spray, the absorption of the nicotine by the mouth's mucous membranes may be diminished.

ELECTRONIC CIGARETTES:

An e-cigarette is an electronic device that is similar in design to the popular tobacco cigarette, but allows smokers to inhale nicotine without the additional toxin chemical products. It is a widely used form of nicotine containing products (NCPs) (NHS 2015). In the United Kingdom, the number of e-cigarette users increased from 700,000 in 2012 to 2.8 million in 2016; however, although e-cigarettes are unlicensed nicotine products in the UK, they have been available in markets since 2006 (ASH 2016). Over 400 e-cigarettes brands and 7,000 flavours are in the markets (Zhu et al. 2014). It is presumed that e-cigarettes may help stop smoking, particularly over the long-term (McRobbie et al. 2014). However, batteries are used in e-cigarettes, presenting a risk of explosion, and poisoning (NHS 2015). Moreover, carcinogenic elements were found in a lab test of the contents of e-cigarettes (FDA 2009; Jensen et al. 2015). E-cigarettes are not yet licenced by the Medicines and Healthcare Products Regulatory Agency (MHRA) in the UK and the Food and Drug Administration (FDA) in the USA, because the safety of e-cigarettes is still not clear (ASH 2016; FDA 2016; MHRA 2016). The NICE published a report in 2013 that does not recommend the use of unlicensed NCPs such as e-cigarettes although the report stated that e-cigarettes are safer than tobacco (NICE 2013).

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