

**Tobacco consumption remains a health and financial burden globally. With many experiencing significant health concerns from prolonged use, health professionals are looking into electronic cigarettes as a possible form of therapy that can aid people with smoking cessation. Discuss whether medical professionals should advise patients to transition towards electronic cigarettes, with regards to the benefits provided.**

### ***Abstract***

Electronic cigarettes are aerosol generating devices that provide smokers an alternative form of nicotine therapy. The solution used contains a specified amount of nicotine along with flavourings and diluents. When compared to tobacco smoke, electronic cigarettes present a beneficial alternative as the presence of cancer containing substances is severely reduced. This correlation can also be seen in second-hand smoking. Regulating electronic nicotine sales remains a top priority, balancing the financial attractiveness to adults while preventing underaged consumption and potentially providing an early gateway to long term smoking. Motivation and willingness to quit remain important factors for successful long term smoking cessation. When compared to other forms of nicotine replacement therapy, electronic cigarettes were found to have a reduction in common toxins and provided an increase in physical health. Considering this, it is vital to remain mindful of social factors that can predispose certain groups to smoking to maximise patient care and outcome.

The use of electronic cigarettes (e-cigarettes) remains a controversial topic amongst health professionals, when concerning its safety on an effective treatment method for successful smoking cessation [1]. Cigarette tobacco consumption costs the NHS £2 billion pounds per annum for treating smoking related diseases [2], as well as having a mortality rate of 78,000 per year [3]. Recent studies have shown promising short to mid-term results of e-cigarettes in improving respiratory functions, and decreasing carcinogenic substances and toxins entering the body, when compared to regular tobacco consumption [1]. The lack of

longitudinal research is arguably the main concern when dealing with these electronic devices, due to their very recent invention and rising growth in popularity. As a consequence, the increased popularity attracted underaged consumers, due to the abundance of new nicotine-containing juices with sweet and fruity flavours [4]. In light of this, this essay will support the notion of doctors and medical health professionals recommending smokers to transition towards e-cigarettes, with the addition of stricter regulations and laws concerning their sales and ingredients. It will begin by introducing the composition of these e-cigarette devices, along with their nicotine juices, followed by initiatives currently being devised by government officials to tackle smoking cessation. The safety of e-cigarettes, when compared to ordinary cigarettes will also be addressed, while also taking a closer look at the effects of e-cigarettes in helping smokers quit.

“E-cigarettes are electronic devices that produce an aerosol (often incorrectly referred to as a ‘vapour’) that is inhaled by the user.” [1]. These devices contain a solution made of diluents, flavourings and nicotine, which give off aerosol when heated by the device. Recent concerns have risen from the public regarding the safety of the aerosol, particularly the chemical makeup of it and their health risks. Tobacco smoke contains several chemicals when burnt, 69 of which are known to be carcinogenic [5]. In comparison, e-cigarettes have been found to contain toxins, also seen in tobacco smoke, such as lead and nickel, however a recent study investigating 12 e-cigarette brands found these levels of toxins ranging from 9 to 450 times lower than in tobacco smoke [6]. This supports the notion that smoking e-cigarettes is a much safer alternative when compared to tobacco smoke, in terms of the quantity of these chemicals entering your body at a given time. Despite claims from another study regarding human cancer risk being 5 to 15 times higher in e-cigarette users compared to tobacco smoke users, due to formaldehyde production, this author remains supportive towards e-cigarettes’ safety [7]. He reinforces his position by criticising the study conducted, stating their method of running the devices at extreme temperatures, producing undesirable “dry puffs” to be highly unrealistic. He also notes, that when there was no overheating, no formaldehyde was found to be produced. Furthermore, passive smoking,

also known as second-hand smoking, is always a hot topic which raises more concerns about passive inhalation of aerosol. The author argues on this proposed similarity, claiming exposure of aerosol to non-smokers produces nicotine at levels one-tenth of a cigarette [8]. The author expressed interest in the implementation of e-cigarettes as a harm reduction strategy, claiming smokers had a higher chance of quitting when using nicotine containing e-cigarettes. Harm reduction strategies can be a very effective tool to target smokers that struggle with smoking cessation, or simply refuse to quit, however care must be taken to ensure harm reduction strategies are implemented effectively by the governments globally.

The sudden increase in popularity of e-cigarettes over the years has divided the public in terms of its use. Considering this, the US government proposed a continuum of harm reduction strategies, which display a series of policies for e-cigarettes, ranging from least restrictive measures such as increasing e-cigarette promotion for smokers, to very restrictive measures such as eliminating all flavours other than the basic tobacco flavour in e-cigarettes [4]. Despite great efforts in applying these strategies, careful consideration must be taken to prevent access to young non-smokers while making it easier to access to adult smokers at the same time. A certain method that is being considered is the taxation of e-cigarettes by making it high enough to ward off young customers, but not too high making it financially unattractive for adults [4]. Unfortunately, this is entirely dependent on how high states are willing to increase their taxes on tobacco cigarettes, which poses a problem, as tobacco companies earn billions of dollars annually, generating \$12.46 billion through taxes for the US government in 2019 alone [9]. Increasing taxes on cigarettes will lead to the loss of revenue for not only the tobacco companies but for the government itself. This raises a lot of concerns as to whether the US government will favour economic profit over the general health of the citizens, in particular the smokers, by keeping the tobacco cigarette taxes the same and delaying the process of which e-cigarettes is effectively used as a harm reduction tool. It can be argued that this delay is resulting in several deaths and diseases, which could have been prevented if priority was shifted towards the health of smokers sooner. As a result, more research is needed to support the effectiveness of e-cigarettes in

smoking cessation, which in turn would emphasise its application even further as a harm reduction tool, leading to a higher possibility of it being implemented.

In order for medical professionals to support the use of e-cigarettes in helping smokers quit, more research must be compiled with enough data to support this new device. Fortunately, Cochrane eases this process by reviewing all the evidence in healthcare interventions and summarising them, providing unbiased information to medical professionals that require it. The author of their review on e-cigarettes, Jamie-Hartmann Boyce summarises their findings by claiming short to mid-term usage of e-cigarettes, up to 2 years showed no serious side effects and was found to aid smoking cessation [10]. The findings also suggested in some cases, changes in the breathing pattern and blood were shown which are consistent with changes found in people who have quit smoking. Based on these findings collected by Cochrane, e-cigarettes can be seen as more of a solution to tackle tobacco smoking and aid in harm reduction, with the hopes of it leading to eventual cessation altogether. The author attempts to debunk a review published in the Lancet, discrediting e-cigarettes and their use in smoking cessation aid, claiming they make it harder to quit based on their findings [11]. While the results accumulated support their conclusion, Jamie argued that the use of non-randomized controlled trials led to these results. He reinforces his claim by stating research that had included only randomized controlled trials found a positive correlation between e-cigarette usage and the success rate in smoking cessation. The author concludes his review by expressing the need for more longitudinal research, as this would only further our understanding and ensure a sensible conclusion is reached sooner. Despite the promising results of e-cigarettes in smoking cessation, it is important to consider each smoker in a case by case basis, such that their physical, social, and mental wellbeing during the treatment is considered when investigating various treatments and their success rates in smoking cessation.

As Doctors it is important to remain compassionate towards the patients' emotions when taking a certain type of treatment. Care must also be taken into their lifestyle and the implications their life choices may have upon the effectiveness of their treatment. An open

longitudinal study by Claudio Lucchiari investigates this idea towards e-cigarettes as a smoking cessation tool. Claudio emphasised the impact of smokers' willingness to quit, stating that even though they were willing to participate, and improved respiratory functions were observed, only 10% remained abstinent from tobacco containing cigarettes. This supports the notion of motivation to quit playing a role in affecting successful abstinence, as smoking cessation fully depends on the willingness of the smoker to persist with the treatment, and whether they want to quit or not [12]. A link was found between stressful psychosocial factors in a smoker's life and reporting a worse outcome in their results, and these factors can range from living in an area with a high prevalence of smokers, to having a low socioeconomic status [12]. When you consider a collection of these factors that a smoker may experience, it can be seen why it may be difficult for them to quit in the first place, and why smokers choose not to quit. General physical wellbeing was also an aspect that affected the outcome of smoking cessation, and this included sleep quality and physical activity, even suggesting a low sleep quality during smoking cessation was a predictor of a poor smoking treatment outcome. As a result of this, it is essential for medical professionals to take a cautious, but holistic approach when it comes to deciding the best treatment method for a patient, factoring in their specific lifestyle with their decision. In order to look at different treatment methods for smoking cessation, we must first examine the toxins and carcinogens between these methods to determine which is the safest option to use.

A study done by Lion Shahab aimed to compare nicotine, tobacco related carcinogens, and toxins across 5 different test groups, consisting of tobacco cigarette smokers, e-cigarette smokers, and Nicotine replacement therapy (NRT) users. More specifically these 5 groups consisted of: tobacco cigarettes only, former smokers with long term use of e-cigarettes, former smokers with long term use of NRT, tobacco cigarettes and NRT, and tobacco cigarettes and e-cigarettes [13]. The results assembled over 6 months found that nicotine levels were similar amongst all groups, however the group containing e-cigarettes only had the least tobacco related carcinogens and toxins compared to the other 4 groups. The results even portrayed a 97% reduction in a common carcinogen between the e-cigarettes

only group and the tobacco cigarettes only group. This study supports several other studies that also produced encouraging findings that suggest e-cigarettes as the better alternative, not only as a smoking cessation tool, but as a method of nicotine delivery. Even though the use of NRT only was also found to have significant reductions in toxins and carcinogens when compared to the other groups, it was still found to have a higher percentage when compared to e-cigarettes only. Acrylonitrile and 1,3-butadiene, which were identified as carcinogens were found to be 72% and 44% less, respectively in e-cigarettes than in NRT [14]. This is an indication of NRT being a viable treatment method however it is important to consider the negative aspects of using NRT, as one important feature it lacks is the satisfaction of a smokers throat hit, in which a fulfilling sensation is felt at the back of a smokers throat as they inhale smoke [15]. Many smokers crave this feeling, making it harder when attempting to quit by using NRT, arguably being a cause that can lead to a failed smoking cessation attempt. A major advantage of e-cigarettes is that it can simulate the similar feeling of a throat hit, through the device, satisfying their cravings and providing a means of managing it through a much safer method.

Every treatment method carries its own risks and benefits, but it is vital for medical professionals to effectively weigh these two together and find a suitable balance, in order to make a sensible decision. Looking back on the points mentioned previously, the short to mid-term benefits and risks of e-cigarettes shown solidify the concept of e-cigarettes as an effective treatment method, when you consider the composition of the nicotine containing liquid and the aid e-cigarettes provide in smoking cessation. A common theme found from several of these studies is the lack of longitudinal research as well as the importance of continuing these studies, along with newer studies, with the aim of reinforcing our understanding of e-cigarettes. It can be evident that the more e-cigarettes are studied, the closer doctors can get to a decision in supporting e-cigarettes as a possible form of treatment to assist smokers aiming to quit. With the implementation of stricter laws that regulates these products and focuses on smokers and their access to it, e-cigarettes have the potential of supporting smokers through harm reduction and help increase their possibility of leading a healthier lifestyle.

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