

CATEGORY III – COMMUNICATION, TREATMENT & PREVENTION INTERVENTIONS E-CIGARETTES (EC)

1.0 Introduction

Smoking rates in England have been declining steadily. However, tobacco use and tobacco harm remain a major challenge to public health and affect principally the most disadvantaged communities. The NHS estimates that 79,000 people in England die every year as a result of smoking, and more will die from long-term smoking if they are not supported to quit [1]. Currently, the prevalence of e-cigarette use in adults in the UK is estimated at 6% of the adult population, higher than most EU countries (averaging 2%) but similar to the US [2]. The successive smoking toolkit surveys show that in recent years, e-cigarettes (EC) have become one of the most popular quitting aid for smokers [3] and represent an opportunity to further reduce smoking related death and disease. This is the position taken by public health experts in the UK at the present time [2].

However, this has also been accompanied by confusion and controversy amongst the public and experts with regards to the risks caused by e-cigarettes as compared with the smoking of cigarettes [1]. Many other countries are against vaping and are implementing stricter controls on the development of EC than cigarettes.

LEARNING OUTCOMES

Medical students will understand:

1. The public health challenge presented by tobacco use and related harm.
2. The prevalence of EC use nationally and internationally.
3. The range of products available to deliver nicotine electronically.
4. The evidence of effectiveness of ECs as an aid to quitting smoking and the consequent improvement in smoking related disorders.
5. The safety and hazards of ECs to users and bystanders.
6. The effectiveness of ECs in comparison to varenicline, bupropion and NRT.
7. The controversial issues and potential risks of ECs compared with cigarettes

2.0 Prevalence

There are 8.8 million smokers in the UK and there has been a sharp decline in smoking to 16.8% [4]. It is estimated that there are by contrast 2.6 million users of EC in the UK [5]. Around 1 in 20 adults in the UK use EC. Most EC users are current smokers or ex-smokers who have stopped smoking altogether [6]. The 2015 PHE report states that “regular EC use among youth is rare with around 2% using at least monthly and 0.5% weekly. EC use among young people remains lower than among adults: a minority of British youth report having tried EC (~13%)” [6]. This report also showed that even if some never smokers may experiment with using EC, they are attracting very few to smoke regularly. In fact, reports show that vaping is not promoting smoking and may be reducing it [2, 6].

3.0 Products

Electronic cigarettes are also known as vapourisers or electronic nicotine delivery systems (ENDS). They are

powered by battery, and deliver nicotine by heating a solution of nicotine, mixed with flavouring and glycerol. These electronic devices are composed of a mouthpiece, a battery and a cartridge or a tank containing the nicotine mix [5]. The EC user sucks on this devices, which activates the heating element, heating the liquid in the tank or cartridge, releasing vapour, and thus delivering the nicotine to the user. There are a number of different types of EC: “Cig-a-like” products (the first generation products which were made to look like tobacco cigarettes); ‘Tank’ models (also known as vape pens), now the most commonly used type of EC, which has a tank that can be recharged with liquid nicotine to the strength required and the flavourings preferred by the user; and ‘Mods’ (or advanced personal vaporisers) – which are “a more complex tank model which can be manually customised by, for example, adjusting the voltage on the device” [5].

4.0 Safety

E-cigarettes have been marketed as consumer products and are now more popular than other nicotine replacement therapies (NRT), as a substitute and competitor for tobacco cigarettes. There is early evidence that they may be effective as an aid to quitting smoking [2]. Although EC may present some hazards, a recent Royal College of Physicians report stated that “the hazard to health arising from long-term vapour inhalation from the e-cigarettes available today is unlikely to exceed 5% of the harm from smoking tobacco”. It therefore concluded that e-cigarettes are likely to be beneficial to public health [7]. Another recent study, which was the first to directly compare nicotine, as well as the main carcinogen and toxicant metabolite levels in long-term users of EC NRT, found that ex- smokers who had switched to using exclusively EC or NRT had roughly similar levels of nicotine as cigarette-only smokers; it also stated that the “exclusive use of NRT, and in particular of EC, but not dual use with cigarettes, was associated with lower levels of known tobacco-related carcinogens and toxicants” compared to cigarette only users [11].

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4.1 Safety for Electronic Cigarette users:

- Estimated cancer risks from EC use are low. The recent PHE report concluded that “the cancer potencies of e-cigarettes were largely under 0.5% of the risk of smoking” [2]. So are the relative risks of cardiovascular disease and lung disease [8].
- To date, evidence has not been found to suggest that specific flavourings are a health risk, nor are the levels of metals identified in e-cigarette aerosol. [2].
- Whilst nicotine use may affect physiological systems in some way, the long-term use of nicotine has not been found to seriously increase the risk of health problems in adults. The nicotine intake is comparable to smokers in both vapers and those on NRT as is the toxin intake [11]. Use of NRT in the form of patches by pregnant smokers has not been found to increase risk to the foetus [6]. However, patch adherence was low; only 7% of women used patches for >1 month. Whereas, individuals tend to use ECs over longer periods than NRT and this may be the case during pregnancy. Also, ECs are fast acting, unlike patches, and it remains plausible that nicotine use, via ECs, during pregnancy, is teratogenic. Moreover, nicotine from ECs is likely to have increased delivery speed and bioavailability compared with NRT, whether slow or fast acting, which could potentially increase harm for both mother and foetus [6,12]. Furthermore nicotine may have benefits e.g. lowers BMI (body mass index), prevention of Parkinson's disease and ulcerative colitis. Further research is warranted on nicotine use in adolescents.
- The EC liquid mix contains propylene glycol and/or vegetable glycerol, nicotine and flavourings. It also contains impurities and potential intoxicants but the concentrations of these are much lower than in smoke. Long term use can only pose dangers if toxicants are present in doses that can harm health.
- There have been some adverse effects e.g. irritation and cough, and no serious effects over the short to long term.
- There is potential small a risk of fire from the electrical elements of EC and a risk of poisoning from ingestion of EC liquids, however these are similar to that of other household electrical goods and other household poisonous substances [6].

In summary, health professionals can therefore reassure smokers and encourage them to use EC, particularly as a quitting aid. There is little risk of nicotine poisoning for users, but containers should be child-proof. Smokers should not wait for further proof to switch to vaping.

4.2 Safety for bystanders

- To date, there have been no identified health risks of passive vaping to bystanders [2, 5, 6].
- Unlike smoking, exhaled vapour does not expose bystanders to noxious substances so called ‘passive vaping’. Thus EC are considered to be much less harmful than cigarettes but not completely safe.

In summary, there is no known passive exposure risk to EC

vapour for bystanders. Health professionals can reassure the wider public that e-cigarettes are much safer than smoking.

5.0 Advice to smokers

Smokers have questions about e-cigarettes and health professionals are well placed to answer these. The most common reason for using EC is to reduce the health risks of smoking by stopping completely or reducing smoking. Those that switch to vaping demonstrate significant improvement in asthma, blood oxygen saturation, reduction in infections and also have less weight gain.

5.1 Electronic Cigarette use in non-smokers:

Research to date indicates that vaping in non-smokers does not lead to further use. Regular use by never-smokers remains extremely rare [5, 6].

5.2 Advice regarding Electronic Cigarette use in smokers:

The two main reasons for using electronic cigarette (EC) cited by adult smokers and ex-smokers are to help to quit smoking and harm reduction [6]. In England, over 40% of people who try to stop smoking do so with the aid of EC [8]. This is higher than any other cessation aid.

In the UK a study of 5863 smokers who made a serious quit attempt in the previous year, 20% used EC, 15.4% used no aid and 10% used over the counter NRT [9]. Thus smokers appear to be quitting increasingly with the use of ECs. Smokers in England who use EC in an attempt to quit are also 50% more likely to remain abstinent from cigarettes for a few months, unlike those who try to quit unaided or using a licensed NRT product bought from a store. However, they are probably less likely to remain abstinent from cigarettes than those who attempt to quit whilst attending high quality specialist stop-smoking support available. In terms of prolonged abstinence rates with EC, the available trials only assess 6 month outcomes but longitudinal observational studies suggest good continuous abstinence rates. As the data are observational these cannot be directly compared with other aids to stop smoking. When EC are added to standard treatment, quit rate is higher than in non-EC user groups and feedback is positive [10].

Varenicline, bupropion and NRT remain the treatments with the best evidence [7]. These can be supplemented with EC. Also EC can be the first choice for smokers who have not found other treatments helpful [2]. Those smokers usually need to try several types of EC to find one that works for them.

6.0 Conclusion

The effectiveness and safety of EC is still controversial internationally, and awareness and use of EC varies according to country-specific markets, tobacco control policies and trends of use [13]. There seems to be a rapid progression in EC use worldwide [13].

From the UK perspective, EC are considered to be much less harmful than cigarettes but not 100% safe. The use of EC in never smokers is rare and use among smokers is common. EC are not increasing smoking rates. While varenicline, bupropion and NRT are the treatment with the best evidence, the use of EC as an aid to smoking cessation is associated with increased cessation rates compared with no aid, a licensed nicotine

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product bought in a store or nicotine-free (placebo) EC. Smokers usually need to try several products to decide what is best for them.

As noted in the Royal College of Physicians 2016 report 'Nicotine without smoke: tobacco harm reduction' (7).

A risk averse, precautionary approach to e-cigarettes regulation can be proposed as a means of minimising the risk of avoidable harm e.g. exposure to toxins in e-cigarette vapour, renormalisation, gateway progression to smoking, or other real potential risks. However, if this approach also makes e-cigarettes less easily accessible, less palatable or acceptable, more expensive, less consumer friendly or pharmacologically less effective, or inhibits innovation and development of new and improved products, then it causes harm by perpetuating smoking... getting this balance right is difficult [7, p. 187].

7.0 Vignettes

Vignette 1

A 50 year old male construction worker smokes a pack of cigarettes a day. He has tried to stop smoking several times, including with the aid of NRT and behavioural support, but has never managed to stop completely. He asks you about using electronic cigarettes (e-cigarettes). His wife stopped smoking a year ago using e-cigarettes and is still using EC now. He would like to try EC but has heard that e-cigarettes are just as damaging as the real things, and worries that he will end up addicted to e-cigarettes as well, and that he will never stop.

How would you advise them?

Vignette 2

A 30 year old woman is 10 weeks pregnant and trying to quit smoking. She currently smokes on average 10 cigarettes a day but wishes to stop smoking completely to preserve the health of her baby. She has tried in the past to stop by herself, but only stopped for a few days. One of her friends told her that she used EC to stop smoking when pregnant. She would like to try EC to stop too, but is worried about the damage to the baby from the nicotine when using EC. She also has a 3 year old and is worried about them getting poisoned by the vapour, or if they found the EC and were to play with it and drink the liquid mix.

How would you advise them?

8.0 References

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