Abstract

**Rationale:** E-cigarettes (EC) are increasingly popular among smokers who want to limit the risks smoking poses to their health. There is some evidence that they facilitate long-term smoking cessation and are safe to use over short to mid-term. UK stop-smoking service (SSS) which provides free medications and support to smokers seeking help is currently seeing a reduction in the number of clients as rather than attending stop-smoking clinics, smokers prefer to use EC. Stop smoking medications are more effective when used with motivational support than when used unsupported. If SSS included EC in their treatment options, this could improve EC efficacy and enhance SSS reach.

**Setting:** We piloted the inclusion of free EC with 4-week supply of refills in routine SSS treatment offered to smokers living or working in the City of London. Census was taken after 100 smokers were offered EC.

**Results:** The total of 69 (69%) of smokers accepted EC and 45 (65%) of this group achieved biochemically validated abstinence at 4 weeks. Of smokers not accepting the offer of EC, 14 (45%) were validated abstainers at 4 weeks (X² = 3.53, p = .06).

All successful quitters in the EC group reported using EC on most days throughout their quit attempt. Among this group, 31 (45%) smokers did not use or stopped using other stop-smoking medications. Client feedback was highly positive.

Among smokers who accepted EC and achieved abstinence, all used EC at the end of treatment. Smokers using varenicline plus EC had a higher success rate (85%) than smokers using EC only (54%; X²=4.99, p=0.03).

**Conclusion:** Offering EC as an addition to the standard stop-smoking service may increase service appeal, cost-effectiveness, and efficacy.

Introduction

E-cigarettes [EC] are a consumer product which is increasingly popular among smokers who want to limit the risks smoking poses to their health [1]. There remains some controversy over possible effects of EC on ‘renormalisation’ of nicotine use [2], but they can help smokers quit [3, 4], are safe to use over short to mid-term [3] and even over long term the risks are not expected to exceed 5% of the risks of smoking [5].

Across the UK, Stop Smoking Services [SSS] are currently seeing a reduction in the number of smokers seeking help [6]. One possible explanation of this trend is that rather than attending stop-smoking clinics, smokers prefer to use EC. EC have an advantage over the traditional stop-smoking treatments in that they offer not only nicotine replacement in doses smokers can adjust to their needs, but also sensorimotor replacement and a degree of enjoyment. SSS are being encouraged to consider using e-cigarettes, although these cannot be currently provided on NHS prescription [7].

Nicotine replacement products are more effective when used with motivational support than when used unsupported [8-10] and so it is likely that offering EC with SSS support improves EC efficacy. If SSS started to offer EC, it could attract more smokers to using effective help; and possibly also improve the reach and efficacy of the services.

We piloted the use of EC within a routine stop-smoking service and present our experience and results here as a preliminary report which could be useful to other stop-smoking practitioners.

Methods

In March 2014 the City of London Corporation in collaboration with the Health and Lifestyle Research Unit at Wolfson Institute of Preventive Medicine at Queen Mary, University of London launched a pilot project offering EC to smokers who access local SSS.

EC was offered to all smokers joining the service in addition to the standard treatment (weekly support and stop smoking medications including NRT and varenicline).

EC and refills were provided for 4 weeks from the target quit day (TQD). Clients could keep EC after this initial period and purchase their own refills. Clients received instructions on how to use their EC and were encouraged to use them ad-lib in addition to the prescribed stop-smoking medications.

**EC offered within the pilot: Brands and cost**

Clients were offered a choice of a ‘cig-a-like’ product, which looks like a cigarette and uses disposable cartridges, or a ‘tank’ model, which needs to be re-filled with e-liquid. The latter is less user-friendly but can provide better nicotine delivery (11,12). We provided Gamucci cig-a-like (with a choice of 1.6% or 2.2% per ml nicotine) and the...
basic EVOD tank system with 1.8% per ml nicotine e-liquid. Gamucci is a popular middle-of-the-range product and EVOD is a standard refillable product. The EVOD’s were later replaced with an Aspire version due to issues with leakage from the cheap EVOD model. The total cost of supplies purchased to provide EC for 120 smokers was £2,995, i.e. £25 per client. (For comparison, in the UK, the cost of 3-months of NRT to the National Health Service (NHS) is about £90 per client with single NRT (SSS typically use two types of NRT concurrently) and the cost of 3-months of varenicline is about £160 per client).

**Definition of abstinence**

Abstinence rates were established as per Russell Standard [13] with participants lost to follow-up included as non-abstainers. Self-reported abstinence was biochemically validated via monitoring carbon monoxide (CO) levels in end-expired breath using a cut-off point on 9ppm currently in place within the UK stop-smoking services.

**Results**

We collated the results to March 2015 when 100 smokers who accessed the City of London Specialist Stop Smoking Service were offered EC and completed 4-week follow-up. The total of 69 clients (69%) accepted the offer and received an EC on their target quit date (TQD). Table 1 show baseline characteristics of smokers who did and did not accept the offer of EC.

We did not record the reasons for not wanting EC systematically, but anecdotally, the most frequent explanation was that clients tried EC in the past and did not like them. Other reasons included a concern that EC would remind them of smoking, and media reports suggesting that EC are dangerous.

Among smokers who accepted the EC offer, 47 (68%) reported abstinence from cigarettes at 4 weeks, with 45 (65%) of these self-reports biochemically validated via monitoring carbon monoxide (CO) levels in end-expired air of <9ppm. Two clients could not attend the 4-week session and reported abstinence over telephone. Eighteen (26%) smokers given expired air of <9ppm currently in place within the UK stop-smoking services.

**Client feedback**

Out of 40 clients who provided formal feedback at 4 weeks, 37 (93%) found EC ‘very’ or ‘extremely’ helpful (on the scale ‘not at all’, ‘slightly’, ‘moderately’, ‘very’ and ‘extremely’). Informally, clients often mentioned social situations where other NRT products were seen less efficient in suppressing urges to smoke. Several clients reported that they now recommend EC to smoking friends and family.

Below are two examples of positive feedback written on the evaluation form.

“The Aspire cartomiser provided by your team works very well and at least for me, satisfies social and habitual ‘smoking’ requirements which led me to fall back into smoking on previous attempts to give up…I would say that both the Blu (purchased earlier) and Aspire are about 80% cheaper than normal cigarettes, health benefits notwithstanding. My occasional asthma and use of Salbutamol...
inhalers has dropped by at least 50% I would say if not more” Male, 46, Aspire User Only.

“10 times better than patches” Female, 58, Gamucci User Only.

It is however important to note that end-of-treatment feedback has limited value in smoking cessation as only successful clients tend to complete the course.

Client feedback also identified some problems. One was poor battery life and leakage with the cheap basic EVOD model, mostly resolved by switching to the Aspire product. Nine EVOD’s and one Gamucci had to be replaced. Another issue was getting hold of refills. We provided addresses of on-line suppliers, but smokers preferred to purchase cartridges and e-liquids without waiting for mail delivery. There were only a few EC outlets available and products there were more expensive than on-line.

**Adverse reactions**

There was one incident of a leak from EVOD irritating client’s mouth, including a burning lip sensation and a minor skin peel. The client did not seek any medical treatment and the problem was resolved by washing the lip with water.

There were also some reports of irritation at the back of the throat (which some smokers liked) and minor coughing. This corresponds with known side effects of EC use and it is in line with common side effects of using oral NRT.

**Discussion and Conclusions**

Most (69%) of the clients offered EC were interested in using them. Clients who accepted EC had higher validated 4-week quit rate than those who refused the offer (65% vs 45%), but the difference did not reach statistical significance.

Across the UK specialist stop-smoking services, the current CO-validated quit rate is 38% [6]. Adding EC to standard treatment certainly did not reduce treatment efficacy and may have increased it. This positive outcome tallies with previous cohort studies which reported encouraging effects of EC use even in hard-to-reach groups including smokers not intending to quit [9] and schizophrenic patients [10].

Providing free EC for four weeks did not increase service costs and in fact generated savings because a proportion of smokers who opted for EC did not use the more expensive standard stop-smoking medications.

The present pilot project has its limitations. The sample size was relatively small, smokers self-selected EC use, and we monitored only short-term 4-week outcomes as per standard SSS reporting. It is possible that on-going EC use may prevent relapse to smoking, which is otherwise the most frequent long-term outcome among successful short-term quitters. There is some evidence suggesting that extended use of NRT improves outcomes [14-19] and smokers report that EC is more enjoyable to use than NRT [20] and so may be used for longer, but more data on long-term outcomes are needed.

Among smokers using EC, those who also used varenicline had significantly higher quit rates than those who used EC only. The four week quit rate of 85% is in fact unusually high. Three studies examined a combination of varenicline and nicotine patches, with two finding no effect [15,6] and one yielding a positive result [17]. The positive trial however included the use of patches for two weeks prior to the target quit date and so the finding may have reflected an NRT preloading effect [18] rather than an effect of NRT + varenicline combination. In contrast to patches which provide no subjective effects, EC offer sensorimotor replacement for cigarettes and a degree of reward. It is possible that a combination of varenicline blunting the desire to smoke and EC providing a behavioural coping strategy and a degree of enjoyment may be particularly effective. Our finding is based on only a subsample of 20 smokers, but it suggests that a combination of varenicline and EC warrants further examination in a placebo-controlled trial.

In summary, offering EC as an addition to the standard specialist service may increase service appeal, cost-effectiveness and efficacy.

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**Conflicts of interest**

Peter Hajek received research funds from and provided consultancy to manufacturers of smoking cessation medications. The remaining authors have no conflicts of interest to declare.

**Reference**


