THE UK ELECTRONIC CIGARETTE RESEARCH FORUM

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Electronic cigarette research briefing – November 2015

This research briefing is part of a series of monthly updates aiming to provide an overview of new studies on electronic cigarettes. The briefings are intended for researchers, policy makers, health professionals and others who may not have time to keep up to date with new findings and would like to access a summary that goes beyond the study abstract. The briefing also aims to provide a critical overview of individual studies and put them in the context of what we already know from previous research.

The studies selected in these briefings do not form an exhaustive list of every e-cigarette-related study published each month. Instead they include those most relevant to key themes identified by the newly formed UK Electronic Cigarette Research Forum. This includes mechanisms and safety, cessation, population level impact, marketing and unintended consequences. For an explanation of the search strategy used, please see the end of this briefing.

The text below provides an overview of the aims, key findings and limitations of each of the highlighted studies. The briefing concludes with a section that puts the study findings in the context of the wider literature and what we know about existing research gaps.

If you would prefer not to receive this briefing in future, just let us know.

1. **Perceived relative harm of electronic cigarettes over time and impact on subsequent use. A survey with 1-year and 2-year follow-ups**

- **Study aims**
  This longitudinal British study explored how perception of harm of e-cigarettes compared to tobacco changed in three successive years using a web survey of smokers and recent ex-smokers. 4,553 people were recruited in 2012. 1204 were successfully followed up through to 2014.

- **Key findings**
  Perception of harm of e-cigarettes compared to tobacco did not change from 2012 – 2013 but increased by 2014; only 60.4% believing e-cigarettes to be less harmful compared to 66.6% in 2012, 16.9% believed them to be equally harmful in 2014 compared to only 9% in 2012. Characteristics associated with accurately believing e-cigarettes are less harmful were previous perception of e-cigarettes as less harmful, having tried e-cigarettes, having stopped smoking and being over 55.

Predictors of subsequent e-cigarette use were perceiving e-cigarettes as less harmful than tobacco, being female and current smoking.

- **Limitations**
  The sample was only broadly representative of sex, age and region in Britain. There was a low response rate at follow up (31% at wave three) and this sub sample was significantly different to the original sample. Smoking, e-cigarette use and harm perception were only measured at yearly intervals and may have changed more often.

  This study did not explore reasons for perception of harm of e-cigarettes or what respondents believed the harm to be.

Brose LS, Brown J, Hitchman SC, McNeill A. Perceived relative harm of electronic cigarettes over time and impact on subsequent use. A survey with 1-year and 2-year follow-ups. Drug Alcohol Depend. 2015 Oct 22. pii: S0376-8716(15)01696-8. doi: 10.1016/j.drugalcdep.2015.10.014.

2. Consumer preferences for electronic cigarettes: results from a discrete choice experiment

- **Study aims**
  This Canadian discrete choice experiment tested the importance placed on different e-cigarette characteristics by non-smoking young people (age 16-24), smoking young people and smokers over 25 (total n=915). Flavour, nicotine content, health warnings and price were studied and participants rated likelihood to try, perceived harm and efficacy for smoking cessation for different combinations of these characteristics.

- **Key findings**
  Around 70% of participants said they would try the offered products (although within non-smoking young people, levels of actually having tried an e-cigarette were only reported as 16%).

  Health warning was the most important attribute determining intention to try the products – non-smokers chose products with no health warning or the most comprehensive warning compared to a shorter warning about addiction or a Health Canada warning about lack of proof for efficacy in quitting, which the smokers preferred. However flavour was a slightly more important indicator of perception of harm, with non-tobacco flavours viewed as less harmful. Older smokers seemed resistant to trying non-tobacco flavours.

  Nicotine content and price were least influential in terms of intention to try and perception of harm, though price was rated higher than flavouring in terms of efficacy.

- **Limitations**
  This was a convenience sample conducted in Canada (where nicotine containing e-cigarettes are banned) in 2013, so it's not clear whether these results could be applied to the UK.

  Reasons for use were not explored so smokers wanting to use the product to try and quit were not separated from those potentially experimenting out of curiosity or for other reasons.

  Only four predefined characteristics were measured and other factors such as branding, advertising, personal recommendation and packaging may be important in determining

product choice. Furthermore these preferences were measured in hypothetical situations rather than reflecting actual product choice.

Czoli CD, Goniewicz M, Islam T, Kotnowski K, Hammond D. Consumer preferences for electronic cigarettes: results from a discrete choice experiment. Tob Control. 2015 Oct 21. doi: 10.1136/tobaccocontrol-2015-052422.

3. Teenage perceptions of electronic cigarettes in Scottish tobacco-education school interventions: co-production and innovative engagement through a pop-up radio project

- **Study aims**
  This qualitative Scottish study explored spontaneous comments on e-cigarettes raised by secondary school children (n=182) who participated in a smoking cessation intervention.

- **Key findings**
  There was a high level of awareness of advertising and availability of e-cigarettes in a range of settings (shopping centres, online, in newspapers, discount stores etc.). E-cigarettes were viewed as cheaper than smoking and most participants also thought it was safer, although there was some debate about whether it was still bad for you and if you kept doing it whether you were still a smoker or not.

  Young people both saw these products being used by adults to get nicotine instead of smoking and as more acceptable for children to use than cigarettes. Attractive features highlighted were not leaving a smell, being able to use the products indoors, looking like a sweet and the variety of flavours for experimentation. But some children also raised concerns about the potential for addiction.

- **Limitations**
  The authors did not originally set out to investigate perceptions of e-cigarettes. Although spontaneous statements on e-cigarettes are potentially more accurate, they may have also been shaped by the smoking cessation intervention context and be in less depth than a specific study.

  This study was conducted in seven schools in one area of Scotland which has previously reported higher than average levels of e-cigarette use so it's not clear how representative these findings are of the UK as a whole.

de Andrade M, Angus K, Hastings G. Teenage perceptions of electronic cigarettes in Scottish tobacco-education school interventions: co-production and innovative engagement through a pop-up radio project. Perspect Public Health. 2015 Nov 5. doi: 10.1177/1757913915612109

4. Adverse Effects of Electronic Cigarette Use: A Concept Mapping Approach

- **Study aims**
  This US study summarises negative effects of experienced e-cigarette users (n=85) recruited mostly via social media and vape conventions. Participants grouped reported experiences into themes themselves and rated how strongly they agreed with each statement.

- **Key findings**

28 of the 79 statements related to physical effects. They varied in severity from dry mouth to sharp cough and burning lips/lungs. There was no mention of long-term health conditions.

The statements participants agreed with mostly strongly were around stigma associated with e-cigarette use, such as being told that it's worse than smoking cigarettes and having to go outside. Other identified themes were worry/guilt, addiction and problems with the device.

- **Limitations**
  These were self-reported adverse events, hence they are subjective and there's no way to know if they are actually associated with e-cigarette use or that all adverse events were reported. Furthermore the method of recruitment and nature of experienced users means this sample is not representative of all users. (This is highlighted by the fact 87% had used their e-cigarette every day for the past 30 days and almost all used tanks or dripping systems – this does not match the profile of e-cigarette use in the UK.)

  Thematic analysis of responses was conducted by participants themselves so it's not clear how reliable this is. A large number of statements were removed following the initial brainstorming task (of 476, only 79 remained) because of duplication or because they were unrelated or contained more than one event.

Soule EK, Nasim A, Rosas S. Adverse Effects of Electronic Cigarette Use: A Concept Mapping Approach. Nicotine Tob Res. 2015 Nov 12. doi: 10.1093/ntr/ntv246

Overview

The first paper included this month explores the perceived harm of e-cigarettes in a group of adults in England who have smoked in the past year. The findings are useful as perceptions of harm have been included in a number of recent reports and presentations in the UK and published in one article on young people but to date not for adult smokers. This longitudinal survey (following up the same people) showed that the proportion of respondents believing e-cigarettes to be less harmful than tobacco significantly decreased from 2013 to 2014. The authors suggest this could possibly be due to misleading media coverage, although the study could not investigate the causes and there may be other factors. This is important, as smokers who understand that e-cigarettes are less harmful were found to be more likely to try or use e-cigarettes, which provide one possible route away from tobacco use.

Discrete choice experiments are a tool used in consumer research to assess preferences between different products or different product characteristics. The second article included this month outlines results from a study in Canada using this approach with three groups: non-smoking young people 16-24, smoking young people of the same age and adult smokers aged 25 and above. Views were captured on four aspects: flavours, nicotine content, health warnings and price. Arguably the most interesting findings were on warning labels which emerged as the most important product attribute in terms of perceptions of harm and intention to use e-cigarettes. Amongst younger and older smokers there was a preference for e-cigarettes with a Health Canada warning label. Although this wasn't the most comprehensive warning label shown (the strongest was one to be used in Europe following the introduction of the Tobacco Products Directive) the findings may indicate that Canadian smokers were reassured of e-cigarette 'safety' by a familiar element of a warning label

from a national body. Interestingly, however, younger and adult smokers who had already tried e-cigarettes did not express a clear preference for the presence or absence of a health warning. This suggests that such warning labels (tailored to the appropriate national context) may be most useful to reassure current smokers who could switch to a less harmful product.

The third paper reports results from a qualitative study involving focus groups with 182 13-16 year old school pupils in Scotland. The main study that the article resulted from was designed to examine pupil responses to a tobacco education intervention and was not focussed on electronic cigarettes. Therefore, the article outlines unprompted quotes about e-cigarettes. In the context of the smoking prevention intervention, participants mentioned e-cigarettes, in particular their availability and price, perceptions of harm and views on nicotine, flavours and use in general. Assessment of tobacco use was not included in the study so the quotes that are included in the article did not differentiate between smokers and non-smokers and therefore it is difficult to draw policy or practice implications from the study. A variety of positive and negative views of e-cigarettes were included but positive perceptions of appeal were a focus of the article.

The final article summarised above reports results from a novel American study with experienced vapers focusing on reports of adverse effects of e-cigarette use. It involves a method called 'concept mapping' and the third author of the study is a consultant for a company which markets software which uses this approach. Participants provided statements in response to a prompt about negative or unpleasant effects they had experienced when using an e-cigarette. These ranged from stigma about use to physical effects such as headaches, dizziness, a sensation of burning in the lungs, burned lip from not using a cap, and (our personal favourite) 'condensation on my moustache from exhale'. Despite the vast majority of the adverse effects being relatively minor, the article does provide an insight into some of the negative outcomes of e-cigarettes use that vapers may experience in the short term. These adverse effects are not compared with those that would arise from tobacco use, but provide potentially helpful insights that could inform product standards and regulation.

Other studies from the last month that you may find of interest:

- Cue-reactivity in experienced electronic cigarette users: Novel stimulus videos and a pilot fMRI study.
- Exposure to electronic cigarettes impairs pulmonary anti-bacterial and anti-viral defenses in a mouse model.
- Electronic cigarettes induce DNA strand breaks and cell death independently of nicotine in cell lines.
- Use of electronic nicotine delivery systems and other tobacco products among USA adults, 2014: results from a national survey.
- Using Twitter Data to Gain Insights into E-cigarette Marketing and Locations of Use: An Infoveillance Study.
- Social Listening: A Content Analysis of E-Cigarette Discussions on Twitter.
- Smoking Cessation and Electronic Cigarette Use among Head and Neck Cancer Patients.
- Dual use of electronic and tobacco cigarettes among adolescents: a cross-sectional study in Poland.
- Counseling patients with asthma and allergy about electronic cigarettes: an evidence-based approach.

- Patterns of Electronic Cigarette Use Among Adults in the United States.
- Perception of electronic cigarettes in the general population: does their usefulness outweigh their risks?
- Differences in the design and sale of e-cigarettes by cigarette manufacturers and non-cigarette manufacturers in the USA.
- Quantifying how smokers value attributes of electronic cigarettes.

Search strategy

The Pubmed database is searched in the middle of each month, for the previous month using the following search terms: e-cigarette*[title/abstract] OR electronic cigarette*[title/abstract] OR e-cig[title/abstract] OR (nicotine AND (vaporizer OR vapourizer OR vaporiser OR vapouriser))

Based on the titles and abstracts new studies on e-cigarettes that may be relevant to health, the UK and the UKECRF key questions are identified. Only peer-reviewed primary studies and systematic reviews are included – commentaries will not be included. Please note studies funded by the tobacco industry will be excluded.

This briefing is produced by Nicola Smith from Cancer Research UK with assistance from Professor Linda Bauld and Kathryn Angus at the University of Stirling and the UK Centre for Tobacco and Alcohol Studies, primarily for the benefit of members of the CRUK & PHE UK E-Cigarette Research Forum. If you wish to circulate to external parties, do not make any alterations to the contents and provide a full acknowledgement. Kindly note Cancer Research UK cannot be responsible for the contents once externally circulated.