New & Emerging Tobacco Products

Linda Bauld & Kamran Siddiqi
Outline

• Electronic cigarettes
• Heat not burn tobacco
• Smokeless tobacco
• Waterpipes
SMOKING RATES DECLINE WITH ACTION

1952 - CR-UK part-funded British Doctors Study is first to demonstrate smoking link to lung cancer

1965 - Advertising of tobacco on TV ends in the UK

1980s - Tax rises for tobacco products

2000s - Media campaigns and services to help people quit

2002 - Larger health warnings

2003 - Billboard and print ads prohibited

2007 - Smokefree policies introduced across the UK

2012 - Point of sale displays removed in large shops

2015 - Small displays removed

2015 - Ban on smoking in cars with children, England & Wales

2016 - EU Tobacco Products Directive (TPD) implemented

2017 - All packs standardised and new tax measures

SMOKING RATES DON’T COME DOWN ON THEIR OWN
During the 1990s, there were periods when smoking rates stopped declining

Source: Adult Smoking Habits in Great Britain. Opinions and Lifestyle Survey, ONS

LET’S BEAT CANCER SOONER.
cruk.org
Terminology

- E-cigarettes are not a single product
- Debate about correct terms to use
- Nicotine delivery varies significantly by product type and patterns of use, and some product features also determine toxicant exposure
E-cigarette Research

• There is now a very substantial body of evidence on e-cigarettes
• The most active funders internationally are NIH and FDA in the USA
• In the UK we have a £5 million programme of research on ECs funded by Cancer Research UK which has supported 40 new studies so far
• Led by Cancer Research UK with Public Health England, we have formed a national forum to keep people up to date.

• We also provide a monthly evidence briefing of the latest studies from a range of countries. This can be sent to anyone, you can sign up via tobaccocontrol@cancer.org.uk
Key Questions for E-cigarette Research

• Who is using the devices including non smokers and young people?
• Is there a relationship between e-cigarette use and smoking?
• Are the devices less harmful than smoking, in what way and to what extent?
• Are they effective for smoking cessation and what device characteristics or patterns of use are associated with cessation?
• Do they assist with relapse prevention and what about long term use?
• Also social science research on marketing, the market, manufacturers, policy framing/development etc
Standardising Survey Questions

Tobacco Control

Special communication

Recommended core items to assess e-cigarette use in population-based surveys

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Author affiliations

Abstract

A consistent approach using standardised items to assess e-cigarette use in both youth and adult populations will aid cross-survey and cross-national comparisons of the effect of e-cigarette (and tobacco) policies and improve our understanding of the population health impact of e-cigarette use. Focusing on adult behaviour, we propose a set of e-cigarette use items, discuss their utility and potential adaptation, and highlight e-cigarette constructs that researchers should avoid without further item development. Reliable and valid items will strengthen the emerging science and inform knowledge synthesis for policy-making. Building on informal discussions at a series of international meetings of 65 experts from 15 countries, the authors provide recommendations for assessing e-cigarette use behaviour, relative perceived harm, device type, presence of nicotine, flavours and reasons for use. We recommend items assessing eight core constructs: e-cigarette ever use, frequency of use and former daily use; relative perceived harm; device type; primary flavour preference; presence of nicotine; and primary reason for use. These items should be standardised or minimally adapted for the policy context and target population. Researchers should be prepared to update items as e-cigarette device characteristics change. A minimum set of e-cigarette items is proposed to encourage consensus around items to allow for cross-survey and cross-jurisdictional comparisons of e-cigarette use behaviour. These proposed items are a starting point. We recognise room for continued improvement, and welcome input from e-cigarette users and scientific colleagues.

http://dx.doi.org/10.1136/tobaccocontrol-2016-053541
Are they less harmful than smoking?

Nicotine, Carcinogen, and Toxin Exposure in Long-Term E-Cigarette and Nicotine Replacement Therapy Users

The research team: Lion Shahab, Maciej L. Goniewicz, Benjamin C. Blount, Jamie Brown, Ann McNeill, K. Udeni Alwis, June Feng, Lanqing Wang, Robert West

Published in Annals of Internal Medicine 7th Feb 2017
Funded by Cancer Research UK
Nicotine metabolites

- No differences in nicotine intake among users of any product, irrespective of smoking status

*Adjusted for socio-demographic, physical and mental health characteristics and latency to product use
Nitrosamines

• Significant reduction in NRT/EC-only users compared with cigarette smokers

NNK (NNAL) (95% CI)

% of cigarette-only smoker levels*

NRT Only

EC Only

NRT+Cig

EC+Cig

97.5%

*Adjusted for socio-demographic, physical and mental health characteristics and latency to product use
Selected toxic volatile organic compounds

- Significant reduction in NRT/EC-only users compared with cigarette smokers (even greater reductions for Acrylonitrile & Butadiene)

**Acrolein (3-HPMA) (95% CI)**

*Adjusted for socio-demographic, physical and mental health characteristics and latency to product use*
Key findings

• Current E-cigarettes are good nicotine delivery devices
  – Intake similar to combustible cigarettes > likely to be effective for helping people stop smoking

• Long-term use of e-cigarettes only is associated with reduced exposure to known smoking-related toxicants/carcinogens
  – Intake similar to NRT, a safe product > likely to result in significantly reduced cancer (health) risks long-term

• Dual use of e-cigarettes or NRT with combustible cigarettes does not appreciably reduce exposure to known smoking-related toxicants/carcinogens
  – Long-term health benefits of e-cigarette use only likely following complete cessation of combustible cigarettes
Where we are now in the UK...

September 2015: The UK public health community issues a joint statement making clear that all the evidence suggests that e-cigarettes are significantly less harmful than smoking and current smokers should not be discouraged from using them.
E-cigarettes definitely less harmful than smoking

First published on 21 September 2017

Key stakeholders in tobacco and health in Scotland have agreed for the first time that using e-cigarettes is definitely less harmful than smoking tobacco. Based on the current evidence, the consensus is also clear that using e-cigarettes while still smoking (dual use) does not provide health benefits.

NHS Health Scotland led the consensus with over 20 partners in the NHS, Scottish Government, third sector and academia. Its aim is to clarify any confusion around the harms and benefits of using e-cigarettes.
But... perceptions of harm are going the wrong way

<table>
<thead>
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<th>Year</th>
<th>More or equally harmful</th>
<th>Don't Know</th>
<th>Less harmful</th>
<th>Lot less harmful</th>
<th>Harmless</th>
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<td>2015</td>
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<td>2014</td>
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<td>2013</td>
<td>9</td>
<td>29</td>
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Heat not burn tobacco
Current research

• Very limited independent research conducted to date
• Vast majority of published evidence is from the tobacco industry, particularly PMI
• However, health research funders are now commissioning studies on heat not burn. Cancer Research UK has recently funded a new study to look at comparable levels of toxicant exposure in users compared with smokers
• I’ll summarise a couple of recent published examples
Comparing nicotine delivery

- Small study conducted in an independent lab in Greece
- Aimed to measure nicotine levels to the tobacco and levels emitted to the aerosol of iQOS compared to e-cigarettes and a tobacco cigarette
- iQOS delivered nicotine to the aerosol at levels higher than ECs but lower than a tobacco cigarette (with no change for longer puff duration)

Cancer Risk & Emissions

- August 2017 paper from Ed Stephens in Tobacco Control
- In terms of lifetime cancer risk, this is highest for smoking and significantly lower for any of the other products including heat not burn
- Most e-cigarette emissions data suggested a cancer risk from vaping of around 1% that of smoking, but there were some exceptions
- Estimated cancer risks from heat not burn were also far lower, at around 10% of the risks of smoking, but this was based on available data from only one prototype device

Smokeless tobacco (ST)

“a number of products containing tobacco, which are consumed without burning through the mouth or nose”

“the **differences in risks** associated with use of **different smokeless tobacco** products mean that it would be scientifically inappropriate to consider smokeless tobacco as **a single product** for the purposes of estimating risk or setting policies”

WHO 2009
Smokeless tobacco

Diverse Products

What matters?

– Tobacco plant, Processing, Additives, Method of consumption

Determining?

– pH (Alkaline)
– Nicotine content (mg/g)
– Carcinogens - Tobacco-Specific Nitrosamines (TSNA – NNN, NAT, NAB, NNK), arsenic, beryllium, cadmium, nickel, chromium, nitrite, nitrate
Snus (Swedish)

A heat treatment process
Contains tobacco, water, sodium carbonate, sodium chloride, moisturisers & flavoring
Placed between the gum and upper lip
South and Southeast Asian products

• User prepared
• Custom made
• Manufactured
  – local and small scale
  – large industrial scale
<table>
<thead>
<tr>
<th>Products (regions)</th>
<th>pH</th>
<th>Nicotine (mg/g)</th>
<th>Total TSNAs ng/g</th>
</tr>
</thead>
<tbody>
<tr>
<td>Snus (Nordic countries)</td>
<td>6.6 – 7.2</td>
<td>7.8 – 15.2</td>
<td>601 - 723</td>
</tr>
<tr>
<td>Chewing, Snuff, Snus (US)</td>
<td>4.7 – 7.8</td>
<td>3.9 – 40.1</td>
<td>313 – 76,500</td>
</tr>
<tr>
<td>Naswar (Central Asia)</td>
<td>8.4 – 9.1</td>
<td>8.9 – 14.2</td>
<td>478 – 1,380</td>
</tr>
<tr>
<td>Tambook (Sudan)</td>
<td>7.3 – 10.1</td>
<td>9.6 – 28.2</td>
<td>302,000 – 992,000</td>
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<tr>
<td>Khaini (South Asia)</td>
<td>9.6 – 9.8</td>
<td>2.5 – 4.8</td>
<td>21,600 – 23,900</td>
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<tr>
<td>Zarda (South Asia)</td>
<td>5.2 – 6.5</td>
<td>9.5 – 30.4</td>
<td>5,490 – 53,700</td>
</tr>
<tr>
<td>Gutkha (South Asia)</td>
<td>7.4 – 8.9</td>
<td>0.2 – 4.2</td>
<td>83 – 23,900</td>
</tr>
</tbody>
</table>
**Prevalence**

ST consumption (adults) reported in **115 countries**

*Females*: Mauritania (28.3%), Bangladesh (27.9%), Madagascar (19.6%), India (18.4%), Bhutan (17.3%)

*Males*: Myanmar (51.4%), Nepal (37.9%), India (32.9%), Uzbekistan (31.8%), Bangladesh (26.4%)

Europe, highest in Nordic countries

  - Sweden (24% males, 7% females)
  - Norway (20% males, 6% females)
Diseases associated with ST

- Oral Cancer (Mouth, lip, tongue, gum)
- Pharyngeal Cancer
- Laryngeal Cancer
- Oesophageal Cancer
- Pancreatic and other cancers
- Coronary Heart Disease
- Stroke
- Oral Disease (non-cancerous)
- Poor maternal and neonatal outcomes
Burden of disease

• Cancer deaths due to ST – 62,283 and DALYS lost 1,711,539
• CVD deaths due to ST – 204,309 and DALYS lost 4,725,381
• 3/4 of this burden is among males
• 85% of this burden is in South-East Asia (74% in India, 5% in Bangladesh)
Smokeless tobacco control

• Lack of awareness of ST-related harms
• ST products are cheap, widely accessible and taxes are less than cigarettes
• Products are diverse and supply chains are less well understood – ST is poorly regulated
• Graphic health warnings are applied inconsistently
• ST cessation interventions are not available
Knowledge gaps

– How to administer tax when ST products and supply chains are so diverse?
– How to avoid product substitution?
– How to enhance capacity to test and measure ST contents?
– How best to implement graphic pictorial warnings?
– How to improve compliance with bans on ST advertising, promotion and sponsorship?
– How to help people to quit ST?
Waterpipe (WP) Tobacco Smoking

- Flavoured tobacco mixture
- Unflavoured dry tobacco leaf
How is WP different from cigarette smoking?

• Tobacco burning is sustained by charcoal

• ‘Molasses’ flavourings

• Higher flow rates/puff volumes

• Long flow path with humidifier (produces cool ‘smooth’ smoke)
Why is WP smoking becoming popular?

WP perceived to be less harmful

- “Filtering means less nicotine and tar.....”
- “....water acts as a filter to get rid of bad stuff...”
- “Water catches the ashes from the charcoal. Its like a cigarette filter, water is a natural filter....”
- “Flavour and smell indicate it’s safe....”
- “Fruit flavours makes it less harmful. I don’t believe it is as harmful as cigarettes...”
- “Cigarettes are much more harmful...as the dangers are publicised. I don’t really see the danger (of smoking waterpipe)....There are no warnings on TV....”

(Roskin & Aveyard 2009)
Allure of WP smoking and thriving café culture

• I enjoy the taste, smell, smoothness
• It’s a good way to socialize with friends
• I like the social ambience
• I like trying things that are new, different, or “hip”
• It helps me not smoke cigarettes

<table>
<thead>
<tr>
<th></th>
<th>Men (%)</th>
<th>Women (%)</th>
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<tr>
<td>Alone</td>
<td>3</td>
<td>0.0</td>
</tr>
<tr>
<td>With friends</td>
<td>86</td>
<td>54</td>
</tr>
<tr>
<td>With family members</td>
<td>11</td>
<td>46</td>
</tr>
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</table>

Maziak, et al., IJTLID, 2004
Waterpipe delivery of nicotine

Cobb et al., 2011

61 liters of smoke

1 liter of smoke
Carcinogen exposure over 24 hours

- Hospital setting, cross-over design, N=13 dual users
- All day *ad libitum* cigarette smoking (11 cpd mean) versus 3 WTS use sessions
- Measurements on day 4 of 4-day protocol.

Waterpipe smoking and cancer: systematic review and meta-analysis

Zahra Montazeri, Christine Nyiraneza, Hoda El-Katerji, Julian Little

Figure 1  Forest plots of odd ratios for association between waterpipe smoking and lung cancer.
Regulating advertising, promotion and sponsorship
Current health warning labels

- Mentioning an expiry date making waterpipe tobacco products seem misleadingly safe to be consumed prior to expiration
- In the ingredients, they mainly mentioned natural flavors
- They also stated that the waterpipe tobacco contains 0.05% Nicotine and 0.0% Tar
Knowledge gaps

• How to effectively implement tobacco taxation, banning advertisement, promotion, and sponsorship, and clean indoor air policies on waterpipe smoking?

• How to strengthen supportive systems (homes/parent, schools/community based organizations) to enhance their influence to prevent and/or control use of waterpipe?

• How to support waterpipe smokers to quit?