Patterns in Use Behaviors across Electronic Cigarette Device Types

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Electronic cigarette (e-cigarette) awareness and use is increasing in the U.S.

Marketplace characterized by a diverse range of device types

“Types and models There are three basic types of e-cigarettes: cigalikes, eGos and mods … Some e-cigarette sites also sold e-hookah (an electronic version of the traditional hookah), and e-cigars or e-pipes (electronic versions with a similar shape to traditional cigars or pipes).”

Zhu, S. H., et al. (2014)
<table>
<thead>
<tr>
<th>Product</th>
<th>Description</th>
<th>Some Brands</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disposable e-cigarette</td>
<td>Cigarette-shaped device consisting of a battery and a cartridge containing an atomizer to heat a solution (with or without nicotine). Not rechargeable or refillable and is intended to be discarded after product stops producing aerosol. Sometimes called an e-hookah.</td>
<td>NJOY, OneJoy, Aer Disposable, Flavorvapes</td>
</tr>
<tr>
<td>Rechargeable e-cigarette</td>
<td>Cigarette-shaped device consisting of a battery that connects to an atomizer used to heat a solution typically containing nicotine. Often contains an element that regulates puff duration and/or how many puffs may be taken consecutively.</td>
<td>Blu, GreenSmoke, EonSmoke</td>
</tr>
<tr>
<td>Pen-style, medium-sized rechargeable e-cigarette</td>
<td>Larger than a cigarette, often with a higher capacity battery, may contain a prefilled cartridge or a refillable cartridge (often called a clearomizer). These devices often come with a manual switch allowing to regulate length and frequency of puffs.</td>
<td>Vapor King Storm, Totally Wicked Tornado</td>
</tr>
<tr>
<td>Tank-style, large-sized rechargeable e-cigarette</td>
<td>Much larger than a cigarette with a higher capacity battery and typically contains a large, refillable cartridge. Often contains manual switches and a battery casing for customizing battery capacity. Can be easily modified.</td>
<td>Volcano Lavatube</td>
</tr>
</tbody>
</table>

Figure 2. Examples of different e-cigarette products
Reports suggest various terms are used

**E-Cigarettes, by Other Names, Lure Young and Worry Experts**

By MATT RICHTEL  MARCH 4, 2014

E-Cigarettes That Don’t Look It

Like a cigarette, e-cigarettes, e-hookahs and vape pens can be nicotine delivery devices. Unlike a cigarette, these are unregulated by the F.D.A. They come in a variety of flavors, like Belgian waffle, vanilla cupcake, and peppermint blast.

Cigarette

e-Cigarettes

**Njoy**

Traditional Flavor

**Blu**

Regular

**Vape Pens**

These come in a variety of shapes and designs and can be interchangeable with e-hookahs. This particular device is advertised as an “electronic cigarette” and includes a battery and charger.

**e-Hookahs**

**Imperial Hookah**

Strawberry Margarita

Label states nicotine content

**King eHookah**

Grape Apple

Label says “This product contains nicotine” and later “no nicotine”

**Logic Hookah**

Blueberry

Label boasts “viscous breath” and “satisfies nicotine cravings”

**Excellent E-cig**

Melon

No indication of nicotine contents but warning label states, “Nictone is highly addictive”

The New York Times, Richtel 2014
Challenges in understanding e-cigarette use

- Most national surveillance systems currently do not capture detailed data on e-cigarette use
  - range of devices available
  - patterns of use among various devices

- Such data are challenging to collect
  - speed that new products are brought to the market
  - variation in terms used to market and refer to devices
  - not easily measured with items used for cigarettes, such as self-reported cigarettes per day
OBJECTIVE:
Explore users’ reported consumption behaviors and preferred device types
Sample recruitment

Participants selected for the study responded to Craigslist ads posted in cities in 12 U.S. states

A convenience sample of 196 respondents was drawn using screening survey responses for several criteria:

- Age 18+
- US resident
- Used an e-cigarette within the last 7 days
- Provided a valid email address
- Completed entire screener
Data collection

Individuals sampled were invited via email to participate in a brief web survey in one of two rounds of data collection:

- Round 1: February 18-23, 2015
- Round 2: March 23-30, 2015

Final N=136

- 60 cases were dropped from final analysis, including eligibles, nonrespondents, and cases that did not indicate frequency of e-cigarette use for all device types.
Sample characteristics

- Mean age = 32
- Gender
  - Male: 52.2%
  - Female: 47.8%
- State of residence
  - California: 22.8%
  - Oregon: 9.6%
  - Washington: 14.7%
  - Colorado: 7.4%
  - Texas: 6.6%
  - Kansas: 0.7%
  - Illinois: 13.2%
  - North Carolina: 5.9%
  - Virginia: 2.9%
  - Maryland: 2.9%
  - Pennsylvania: 9.6%
  - Massachusetts: 3.7%
Measuring current use across device types

- Asked respondents to report current use for 5 device types, each illustrated with a range of sample images:
  - Disposable “cigalike”
  - Rechargeable “cigalike”
  - Pen style “refillable”
  - Tank style (or “mod”)
  - Vapor pipe

- Respondents reported whether they used each:
  - Every day
  - Some days
  - Not at all
What types of devices are being used and by whom?
## Self-reported current use by device type

<table>
<thead>
<tr>
<th></th>
<th>Disposable “cigalike”</th>
<th>Rechargeable “cigalike”</th>
<th>Pen-style refillable</th>
<th>Tank Style/ “Mod”</th>
<th>Vapor Pipe</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Every day</strong></td>
<td>14.0%</td>
<td>25.0%</td>
<td>19.9%</td>
<td>11.8%</td>
<td>0.7%</td>
</tr>
<tr>
<td><strong>Some days</strong></td>
<td>51.5%</td>
<td>40.4%</td>
<td>40.4%</td>
<td>27.2%</td>
<td>14.0%</td>
</tr>
<tr>
<td><strong>Not at all</strong></td>
<td>34.6%</td>
<td>34.6%</td>
<td>39.7%</td>
<td>61.0%</td>
<td>85.3%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>
Concurrent use of multiple devices was common

<table>
<thead>
<tr>
<th># Products Currently Used</th>
<th>Frequency</th>
<th>Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>39</td>
<td>28.7</td>
<td>28.7</td>
</tr>
<tr>
<td>2</td>
<td>39</td>
<td>28.7</td>
<td>57.4</td>
</tr>
<tr>
<td>3</td>
<td>29</td>
<td>21.3</td>
<td>78.7</td>
</tr>
<tr>
<td>4</td>
<td>16</td>
<td>11.8</td>
<td>90.4</td>
</tr>
<tr>
<td>5</td>
<td>13</td>
<td>9.6</td>
<td>100.0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>136</strong></td>
<td><strong>100.0</strong></td>
<td></td>
</tr>
</tbody>
</table>
Single and multiple device users by preferred device

- **Disposable "Cigalike"**
  - Single Device Users: 35%
  - Multiple Device Users: 65%

- **Rechargeable "Cigalike"**
  - Single Device Users: 19%
  - Multiple Device Users: 81%

- **Pen Style Refillable**
  - Single Device Users: 34%
  - Multiple Device Users: 66%

- **Tank Style/"Mod"**
  - Single Device Users: 41%
  - Multiple Device Users: 59%

- **Vapor Pipe**
  - Single Device Users: 0%
  - Multiple Device Users: 100%
Age by preferred device

- Disposable "Cigalike": 33
- Rechargeable "Cigalike": 34
- Pen Style Refillable: 30
- Tank Style/"Mod": 30
- Vapor Pipe: 29
Sex by preferred device

- **Disposable "Cigalike"**
  - Female: 58%
  - Male: 42%

- **Rechargeable "Cigalike"**
  - Female: 55%
  - Male: 45%

- **Pen Style Refillable**
  - Female: 53%
  - Male: 47%

- **Tank Style/"Mod"**
  - Female: 29%
  - Male: 71%

- **Vapor Pipe**
  - Female: 0%
  - Male: 100%
Race by referred device

- **Disposable "Cigalike"**
  - White, Non-Hispanic: 42%
  - Non-White: 58%

- **Rechargeable "Cigalike"**
  - White, Non-Hispanic: 53%
  - Non-White: 47%

- **Pen Style Refillable**
  - White, Non-Hispanic: 44%
  - Non-White: 56%

- **Tank Style/"Mod"**
  - White, Non-Hispanic: 41%
  - Non-White: 59%

- **Vapor Pipe**
  - White, Non-Hispanic: 100%
  - Non-White: 0%
How do patterns of use differ among users of different device types?
Locations preferred device was used during last 24 Hours or 7 days

<table>
<thead>
<tr>
<th></th>
<th>Disposable “cigalike”</th>
<th>Rechargeable “cigalike”</th>
<th>Pen-style refillable</th>
<th>Tank Style/“Mod”</th>
<th>Vapor Pipe)</th>
<th>All Devices</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inside</td>
<td>58.0%</td>
<td>62.3%</td>
<td>68.8%</td>
<td>94.1%</td>
<td>100.0%</td>
<td>66.2%</td>
</tr>
<tr>
<td>Outside</td>
<td>45.2%</td>
<td>58.5%</td>
<td>68.8%</td>
<td>53.0%</td>
<td>0.0%</td>
<td>55.9%</td>
</tr>
<tr>
<td>In a car</td>
<td>19.4%</td>
<td>26.4%</td>
<td>43.8%</td>
<td>47.0%</td>
<td>0.0%</td>
<td>30.9%</td>
</tr>
</tbody>
</table>
Self-reported use behaviors ranged widely

<table>
<thead>
<tr>
<th>Preferred device type</th>
<th>Disposable “cigalike”</th>
<th>Rechargeable “cigalike”</th>
<th>Pen-style refillable</th>
<th>Tank Style/”Mod”</th>
<th>Vapor Pipe</th>
<th>All products</th>
</tr>
</thead>
<tbody>
<tr>
<td># occasions in past 24 hours (median)</td>
<td>2</td>
<td>2</td>
<td>5</td>
<td>8</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Range</td>
<td>2-15</td>
<td>1-40</td>
<td>1-700</td>
<td>1-500</td>
<td>3</td>
<td>1-700</td>
</tr>
<tr>
<td># puffs per occasion (median)</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>7</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>Range</td>
<td>2-100</td>
<td>2-100</td>
<td>3-100</td>
<td>3-78</td>
<td>10</td>
<td>2-100</td>
</tr>
</tbody>
</table>
Limitations

• Data are from a convenience sample and may not generalize to all electronic cigarette device users

• Recall of use behaviors may be limited
  • number of occasions
  • number of puffs per occasion

• Results are descriptive
  • dataset includes too few cases to conduct inferential analyses on use patterns
Implications

These exploratory results suggest further study will inform:

Assessments of toxicant and nicotine exposure due to e-cigarettes
  • variation in devices used (individually or in combination)
  • variability of use patterns

Regulations and policies related to the impact of e-cigarettes on population health
  • types of individuals likely to use different devices
  • variation in use patterns across devices used

Measures needed to adequately monitor patterns in e-cigarette use
Conclusions

E-cigarette users frequently use more than one device type.

Device preference may be associated with demographic characteristics:
- such as age, sex, race, and education.

Some devices may be perceived as more acceptable for use indoors:
- particularly tank or “mod” style devices that do not resemble cigarettes as closely as others.

Ranges for self-reported number of occasions and puffs per occasion vary:
- may indicate variation in use patterns across devices.
More Information

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