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## What is included with your online e-cigarette order? An analysis of e-cigarette shipping, product and packaging features

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### Abstract

**Background**—The electronic cigarette industry is growing, with youth using e-cigarettes at higher rates than they are using cigarettes, and retail and online sales projected to reach \$10 billion in 2017. Minimal regulation of the production and marketing of e-cigarettes exists to date, which has allowed companies to promote unsupported claims. We assessed the shipping, product features and packaging of a wide variety of e-cigarettes purchased online by adults and youth.

**Methods**—The most popular internet e-cigarette vendors were identified from a larger study of internet tobacco vendors. Between August 2013 and June 2014, adults made 56 purchase attempts from online vendors, and youth made 98 attempts. Packages received were assessed for exterior and internal packaging features, including product information, health warnings and additional materials.

**Results**—We analysed a total of 125 orders featuring 86 unique brands of e-cigarettes. The contents were rarely indicated on package exteriors. Product information came with just 60% of orders and just 38.4% included an instruction manual. Only 44.6% of products included a health

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**Contributors** RSW had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis. RSW and JCD contributed to study concept and design. All authors contributed to acquisition, analysis or interpretation of the data. AYK, JCD and RSW drafted the manuscript. All authors critically revised the manuscript for important intellectual content. ASA and JCD undertook statistical analysis. RSW obtained funding. RSW provided administrative, technical or material support. RSW is responsible for study supervision.

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warning, and some had unsupported claims, such as lack of secondhand smoke exposure. Additionally, some products were leaking e-liquid and battery fluid on arrival.

**Conclusions**—A large variety of e-cigarette products are manufactured and marketed to consumers. Many products do not include instructions for use, and unsupported claims are being presented to consumers. Effective federal regulation of the manufacturing, packaging, product information and health claims surrounding e-cigarettes is necessary to ensure consumers are presented with accurate e-cigarette use information.

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## Introduction

E-cigarette sales are projected to reach \$10 billion in 2017,<sup>1</sup> with online sales estimated to make up a third of total current sales.<sup>2</sup> Yet, with minimal regulation to date, the online e-cigarette industry has done little to prove product safety or prevent youth access.<sup>3</sup> In our study of online e-cigarette sales to minors,<sup>3</sup> only 5 of 98 orders were rejected based on age verification and none complied with North Carolina's 2013 e-cigarette age verification law<sup>4</sup> or verified age at delivery, as required by the Prevent All Cigarette Trafficking (PACT) Act for cigarettes.<sup>5</sup> Previous research on internet e-cigarette vendors (IEVs) has found a consistent lack of empirically supported health warnings or product use information,<sup>6</sup> unsupported claims about health benefits, smoking cessation and lack of secondhand smoke exposure.<sup>7,8</sup>

With the IEV market-place featuring at least 466 brands and 7764 unique flavours,<sup>9</sup> assessing packaging and product features for a variety of brands and products is essential. Intended to guide future state and federal regulations, this is one of only a few studies to assess shipping, product features and packaging of a wide variety of e-cigarettes purchased online.

## Methods

### Sample

Between February and June 2014, teens aged 14–17 years attempted purchases from 98 of the most popular IEVs.<sup>8</sup> Six months prior, using similar methodology, adult staff attempted purchases from the 56 most popular IEVs. The vendor selection process is detailed elsewhere,<sup>3</sup> primarily based on review of websites identified via sophisticated annually updated algorithms searching over 180 million websites, message boards, news groups and spam emails, ultimately reviewing 32 398 websites to identify 1010 IEVs.<sup>10</sup>

Buyers attempted to purchase the cheapest disposable nicotine e-cigarette available, or the cheapest starter kit if no disposables were available. Each package received was evaluated across a range of metrics (table 1), including details about shipping packaging, product packaging and additional materials included in packages.

### Data analysis

Variables were analysed using one of the three denominators: vendors, orders and products. We analysed a total of 52 adult orders and 73 youth *orders* (n=125) from a total of 91

different *vendors* (due to changes in vendor popularity over time, only 34 appeared in both samples), featuring 112 unique e-cigarette products. These denominators were used to analyse the information relevant to vendors (eg, shipping country of origin), orders (eg, additional package materials) and products (eg, health warnings, manufacturing country) (SAS V.9.3. Cary, North Carolina, USA: SAS Institute Inc).

## Results

The 125 orders received featured 117 (93.6%) starter kits and 8 (6.4%) disposables, with 69 unique brands and 17 unique unbranded products.

### Package exteriors

The majority (86.4%) of packages were delivered by United States Postal Service (USPS), with 19.4% of those originating with a foreign postal service. While 86.6% of the orders included a return address or sender name, only 15.5% of the 97 unique sender names indicated they were tobacco sellers, and 14.4% featured names that could possibly be recognised as e-cigarette related. Only 11 (8.8%) featured other identifying text on the exterior such as 'Vapemail!'. Of these, four indicated an adult signature would be required, and only one actually did. Two packages bore explicit instructions to leave the package with no signature. Thirteen (10.4%) featured customs declarations, but none clearly declared them as e-cigarettes. Four listed potentially vapour-related descriptors (eg, 'atomiser device'), five featured generalised descriptors (eg, 'electronic goods') and four were falsehoods (eg, 'gift pen set').

### Product materials, health warnings and claims, and other features

A detailed list of product materials, health warnings and claims, and other packaging features is in table 1.

Under half of the orders (44.4%) indicated place of manufacturing and of those, 94.4% were manufactured in China. Only three orders (2.4%) indicated where the e-liquid was manufactured; two in the USA and one in the UK. Just 75 orders (60.0%) included any product information, 48 (38.4%) included an instruction manual and 87 (77.7%) products included health warnings and claims.

## Discussion

This study confirms there is a vast array of e-cigarette products available online. Almost all vendors featured starter kits cheaper than disposables, which were often sold in multipacks or at higher prices than starter kits, enticing customers to start with a reusable kit instead of a 'throw away' disposable, nudging them towards becoming regular customers needing to purchase e-liquid refills.

Very few shipping packages indicated that they contained nicotine products, with some falsely describing the contents of the package. The majority of shipper names were not tobacco related, making it difficult for shipping companies, customs officials and parents to identify or prevent deliveries. All e-cigarettes were delivered in violation of North Carolina's

2013 IEV age verification law.<sup>4</sup> Extending the PACT Act and related federal regulations to include e-cigarettes would provide a regulatory structure for banning shipping and requiring age verification for e-cigarettes, especially as the rates of e-cigarette use are increasing among youth.

Only 44.4% of e-cigarettes received actually stated where they were manufactured, making it impossible to track and enforce product safety standards. While the majority of orders received included some type of vendor information, this was often solely a link to the vendor's website. Although the presence of *vendor* information was high, about 40% of products failed to include product information on how to properly assemble and use the e-cigarette, increasing the potential of improper assembly, e-liquid spillage and possible poisoning, and/or the product malfunctioning, or even exploding, potentially causing serious injury or death.<sup>12–18</sup> The Federal Emergency Management Agency found that the majority of e-cigarette fires and explosions were due to using non-manufacturer approved power sources, and recommended manufacturers include proper charging instructions to prevent this from occurring. The Food and Drug Administration (FDA) recently finalised a rule extending their regulatory power to e-cigarettes.<sup>20</sup> The FDA must assess existing product designs in order to issue effective regulations ensuring electrical safety of these products. Consumers are currently buying e-cigarettes from a variety of international companies, manufactured without regulatory oversight, and lacking adequate user instructions.

Nearly 80% of products contained a health warning or claim (many with typographical errors); however, consistent with previous literature, many claims were empirically unsupported.<sup>68</sup> Only 57.1% of e-cigarettes included a health warning against use by pregnant/breastfeeding women, and only two products warned that they were not FDA approved or regulated. Only one product identified its primary active ingredient, nicotine, as addictive, thus potentially misleading consumers of other e-cigarettes that they are not addictive.

Some products claimed to be an effective cessation device or a recommended form of nicotine replacement therapy (NRT), even though e-cigarettes are not an FDA approved form of NRT.<sup>72122</sup> One product included a false claim that the World Health Organization (WHO) recommended their product as a form of NRT. Other claims, such as 'freedom to smoke anywhere' and 'free of tar and other carcinogenic substances' marketed e-cigarettes as healthier alternatives to traditional cigarettes. Recently announced, these health warnings and claims, as well as information about potentially harmful constituents, will now be regulated by the FDA in the upcoming years.<sup>20</sup>

We found great variability in how e-cigarettes were packaged, from boxes that resemble packages for high-end smartphones to bubble wrap or zip-top plastic bags and even packaging resembling a traditional pack of cigarettes, maintaining the mental cigarette connection for the user. This array of packaging characteristics may be due to sellers trying to appeal to a variety of customers. The lack of regulatory oversight on e-cigarettes manufacturing and packaging may have contributed to at least four products leaking e-liquid on arrival, a problem that has been documented in previous literature,<sup>6</sup> and at least three even leaking battery acid. Leaking e-liquid poses a serious health threat via dermal contact

or ingestion of poisonous nicotine, underscoring the need to regulate the manufacturing and packaging process for e-cigarettes.<sup>23</sup>

A limitation of this study is that the products purchased were not a random sample of all products available online, but rather the cheapest products available from the most popular sellers, meaning that in most cases, larger or higher end products were not included in the study sample.

## Conclusion

This study provides information that could guide future regulations and/or delivery company screening protocols for e-cigarette products, such as requiring and looking for tobacco-related or vape-related indicators on package exteriors and requiring adult signatures for delivery. Federal regulation of the manufacturing, shipping, packaging, promotions, health warnings, claims and other marketing surrounding e-cigarettes are needed to minimise youth access and to protect the public from potential harm that could arise from inappropriately packed, labelled or poorly manufactured e-cigarette products.

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### What this paper adds

- ▶ E-cigarettes have been minimally regulated to date, and there is a growing number of products being marketed and sold to consumers online.
- ▶ There are a variety of empirically unsupported health warnings and claims about e-cigarettes being marketed to consumers.
- ▶ Prior to this study there was little information about the shipping, packaging, product and promotional features included with a large and varied sample of online e-cigarette purchases.
- ▶ E-cigarettes are internationally manufactured and shipped in a variety of packages that are often leaking on arrival, and there is an overall lack of e-cigarette product information included with orders, including empirically supported health warnings.
- ▶ Regulation of the manufacturing, shipping, promotions and health warnings, and claims of e-cigarettes is necessary, especially as youth consumption has been increasing, and we do not yet know the long-term health implications of use.

**Table 1**  
**Materials, health warnings and claims, and other features included with adult and youth purchase survey e-cigarette orders**

|  | Frequency n (%) |
|--|-----------------|
| <i>Materials (n=125 orders)</i>              |                 |
| Additional materials present                 | 74 (59.2)       |
| Vendor information                           | 66 (52.8)       |
| Website                                      | 61 (48.8)       |
| Phone number                                 | 34 (27.2)       |
| Email address                                | 8 (6.4)         |
| Mailing address                              | 8 (6.4)         |
| Social media                                 | 7 (5.6)         |
| Product information                          | 75 (60.0)       |
| General product information                  | 60 (48.0)       |
| Instruction manual                           | 48 (38.4)       |
| Promotions (n=45) <sup>*</sup>               | 30 (24.0)       |
| Discount promotions                          | 17 (56.7)       |
| Giveaways included in package                | 8 (26.7)        |
| E-liquid                                     | 5 (16.7)        |
| E-cigarette                                  | 1 (33.3)        |
| \$100 wine voucher                           | 2 (6.7)         |
| Free mail-order e-cigarette accessories      | 2 (6.7)         |
| Brochure on e-cigarette research             | 1 (33.3)        |
| Entry to win a new car                       | 1 (33.3)        |
| Other <sup>†</sup>                           | 4 (13.3)        |
| <i>Warnings and claims (n=112 products)</i>  |                 |
| Warnings and claims present                  | 87 (77.7)       |
| Underage warning                             | 85 (75.9)       |
| Health warnings                              | 50 (44.6)       |
| Pregnant/breastfeeding women                 | 64 (57.1)       |
| Not a treatment/cessation device             | 58 (51.8)       |
| Specific health conditions                   | 50 (44.6)       |
| Ingestion/contact with skin                  | 48 (42.9)       |
| Animal warning                               | 39 (34.8)       |
| California state-specific warning            | 31 (27.7)       |
| Nicotine overdose symptoms                   | 26 (23.2)       |
| Recommends user quit smoking                 | 12 (10.7)       |
| Not FDA approved or regulated                | 2 (1.8)         |
| May contain traces of nuts                   | 2 (1.8)         |
| Harmful to aquatic organisms and environment | 1 (0.9)         |
| If you are on medicine, consult your GP      | 1 (0.9)         |
| Nicotine is highly addictive                 | 1 (0.9)         |



|   | Frequency n (%) |
|---|-----------------|
| Pro-e-cigarette claims  | 11 (9.8)        |
| Free of tar and other carcinogenic substances   | 3 (2.7)         |
| Promoted as effective cessation device  | 2 (1.8)         |
| No secondhand smoking concerns  | 2 (1.8)         |
| E-cigarettes are superior to cigarettes   | 1 (0.9)         |
| Recommended by WHO as NRT (false claim)   | 1 (0.9)         |
| Lack of data regarding long-term effects  | 1 (0.9)         |
| This is a smoking product   | 1 (0.9)         |
| “Modern, revolutionary, realistic smoking experience, no tar, carbon monoxide, tobacco; environmental benefits; cost savings; no odour or combustion by-products; freedom to smoke anywhere, not subject to most public smoking [sic] laws” | 1 (0.9)         |
| Reduce risk to your health/quit smoking; safe/ fashionable/healthy; smoking anywhere; no tar no pollution   | 1 (0.9)         |
| <i>Other features (n=112 products)</i>  |                 |
| Unusual packaging features present  | 83 (74.1)       |
| High-end cardboard box (often with magnetic enclosure) <sup>‡</sup>   | 36 (32.1)       |
| Plastic clamshell packaging (to be hung on displays)  | 18 (16.1)       |
| Resembles pack of cigarettes  | 13 (11.6)       |
| Eyeglasses-like case  | 3 (2.7)         |
| Hard plastic box  | 3 (2.7)         |
| Metal case  | 3 (2.7)         |
| Product packaged in small zip-top plastic bags  | 2 (1.8)         |
| Product wrapped in just bubble wrap   | 2 (1.8)         |
| Clear cylinder plastic tube   | 1 (0.9)         |
| E-cig refill cartridges in a pill-like bottle   | 1 (0.9)         |
| Resembles classic cigarette case  | 1 (0.9)         |
| Tic-Tac-like package  | 1 (0.9)         |
| Products leaking dangerous substances   | 7 (6.3)         |
| E-cigarettes leaking poisonous nicotine e-liquid  | 4 (3.6)         |
| E-cigarettes leaking battery acid   | 3 (2.7)         |

\* There were 45 promotions included among 125 total orders; however, some orders had more than one promotion.

<sup>†</sup> Other items included a pack of vendor-branded matches, a ‘product authenticity card’ and two J.R. Cigar Magazines.

<sup>‡</sup> Similar to what one would receive when purchasing a high-end smartphone.

FDA, Food and Drug Administration; GP, general practitioner; NRT, nicotine replacement therapy; WHO, World Health Organization.