THE RISE OF E-CIGARETTES: WHAT ARE THEY, WHO’S USING THEM AND WHAT WE CAN DO TO PROTECT YOUTH AND YOUNG ADULTS

BRIAN A. KING, PHD, MPH | DEPUTY DIRECTOR FOR RESEARCH TRANSLATION

American College of Osteopathic Internists 2019 Annual Convention and Scientific Sessions ● November 1, 2019
DISCLOSURES

• Funding Source
  • U.S. Government

• No Industry Funding

• No Off-Label Medication Uses
<table>
<thead>
<tr>
<th></th>
<th>Title</th>
<th>Image</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>What Are They?</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Why Are They Popular?</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Who's Using Them?</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Are They Safe?</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>What Can We Do About It?</td>
<td></td>
</tr>
</tbody>
</table>

**What Are They?**

**Why Are They Popular?**

**Who's Using Them?**

**Are They Safe?**

**What Can We Do About It?**

*WARNING: This product contains nicotine. Nicotine is an addictive chemical.*

*Tobacco-Free Campus*
THE TOBACCO PRODUCT LANDSCAPE CONTINUES TO EVOLVE
THE EVOLUTION OF E-CIGARETTES

1\textsuperscript{st} Generation

2\textsuperscript{nd} Generation

3\textsuperscript{rd} Generation

4\textsuperscript{th} Generation
E-CIGARETTE MARKET SHARE, BY DOLLAR SALES, U.S., 2013 - 2018

WHAT CAUSES YOUTH E-CIGARETTE USE?

Advertising  Flavors  Nicotine
E-CIGARETTE ADS
REACH NEARLY
4 IN 5
U.S. MIDDLE AND HIGH SCHOOL STUDENTS
More than 20 million youth saw e-cigarette ads in 2016.

PERCENT OF STUDENTS EXPOSED TO E-CIGARETTE ADS

<table>
<thead>
<tr>
<th>Year</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>68.9</td>
</tr>
<tr>
<td>2015</td>
<td>73.0</td>
</tr>
<tr>
<td>2016</td>
<td>78.2</td>
</tr>
</tbody>
</table>

YOUTH EXPOSURE TO E-CIGARETTE ADS, 2016

- **Retail Stores**: 68.0% (17.7 million)
- **Television**: 37.7% (9.7 million)
- **Internet**: 40.6% (10.6 million)
- **Newspapers & Magazines**: 23.9% (6.2 million)

Efforts to reduce youth exposure to e-cigarette ads are important to prevent and reduce youth use of these products.

Source: National Youth Tobacco Survey
FLAVORED TOBACCO PRODUCT USE AMONG HIGH SCHOOL STUDENTS, 2014-2018

NICOTINE POSES UNIQUE DANGERS TO YOUNG PEOPLE

E-Cigarette Use Among Youth and Young Adults
A Report of the Surgeon General

Chapter 3
Conclusion 1, 2, & 5

1. Nicotine exposure during adolescence can cause addiction and can harm the developing adolescent brain.

2. Nicotine can cross the placenta and has known effects on fetal and postnatal development. Therefore, nicotine delivered by e-cigarettes during pregnancy can result in multiple adverse consequences, including sudden infant death syndrome, and could result in altered corpus callosum, deficits in auditory processing, and obesity.

Ingestion of e-cigarette liquids containing nicotine can cause acute toxicity and possibly death if the contents of refill cartridges or bottles containing nicotine are consumed.
All JUUL e-cigarettes have a high level of nicotine. According to the manufacturer, a single JUUL pod contains as much nicotine as a pack of 20 regular cigarettes.
NICOTINE SALTS ALLOW HIGH LEVELS OF NICOTINE TO BE INHALED MORE EASILY

Nicotine Salts

Benzoic Acid

Free Base Nicotine
CURRENT TOBACCO PRODUCT USE AMONG U.S. HIGH SCHOOL STUDENTS - NYTS, 2011–2018

Cigarette: 15.8%
Cigar: 11.6%
Smokeless: 7.9%
Hookah: 4.1%
Pipe: 4.0%
E-cigarette: 1.5%

JUUL Market Share rose to over 75% in 2019

EVER USE OF CANNABIS IN AN E-CIGARETTE AMONG YOUTH E-CIGARETTE USERS - NYTS, 2016

EVER USE OF E-CIGARETTES AMONG CURRENT, FORMER, AND NEVER ADULT CIGARETTE SMOKERS — 2010-2018

Source: CDC licensed data fielded by Porter Novelli Services. Summer Styles Survey. 2010-2018
RELATIONSHIP BETWEEN CIGARETTE SMOKING AND E-CIGARETTE USE

What Are They?

Why Are They Popular?

Who’s Using Them?

Are They Safe?

What Can We Do About It?
NET PUBLIC HEALTH BENEFIT OR HARM?

Youth Initiation

Adult Cessation
The long-term safety of e-cigarettes is unknown.

Overall, the USPSTF found the evidence on the use of ENDS as a smoking cessation tool in adults, including pregnant women, and adolescents to be insufficient.

Conclusion 17-1. Overall, there is limited evidence that e-cigarettes may be effective aids to promote smoking cessation.
Leads to initiation of combustible tobacco use among non-smokers, particularly children.

Leads to relapse among former smokers.

Diminishes the chances that a smoker will quit.

Discourages smokers from using proven quit methods.

Exposes children, pregnant women, and non-users to secondhand aerosol.

Glamorizes or renormalizes tobacco use.

Results in poisonings among users or non-users.
E-CIGARETTES MAKE AEROSOL, NOT VAPOR

The e-cigarette aerosol that users breathe from the device and exhale can contain harmful and potentially harmful substances:

- Volatile organic compounds
- Ultrafine particles
- Nicotine
- Cancer-causing chemicals
- Heavy metals such as nickel, tin, and lead
- Flavoring such as diacetyl, a chemical linked to a serious lung disease
MULTI-STATE OUTBREAK OF LUNG INJURIES

- **1,479** lung injury cases associated with the use of e-cigarette, or vaping, products reported *(as of October 15, 2019)*
  - 49 states, DC, and USVI reported cases
  - 33 deaths confirmed in 24 states
  - All patients have reported a history of using e-cigarette, or vaping, products

- Data updated Thursdays on [www.cdc.gov/lunginjury](http://www.cdc.gov/lunginjury)
SYMPTOM ONSET AND HOSPITAL ADMISSION DATES
PATIENTS WITH LUNG INJURY ASSOCIATED WITH USE OF E-CIGARETTE, OR VAPING, PRODUCTS

Recent decline in reported onset and hospitalization due in part to reporting lag

United States, March 31-October 12, 2019
LUNG INJURY CASES REPORTED TO CDC

Legend
Number of lung injury cases per state
- 0 cases
- 1-9 cases
- 10-49 cases
- 50-99 cases
- 100-149 cases

as of October 15, 2019
WHAT WE KNOW

- Most patients report history of using products containing tetrahydrocannabinol (THC)

- Among 849 patients with information on substances used in e-cigarette, or vaping, products in the 3 months prior to symptom onset:
  - About 78% reported using THC-containing products; 31% reported exclusive use of THC-containing products.
  - About 58% reported using nicotine-containing products; 10% reported exclusive use of nicotine-containing products.
What we don’t know

- At this time, FDA and CDC have not identified the cause or causes of the lung injuries in these cases
  - All cases report use of e-cigarette, or vaping, products.
- Might have more than one cause
- Many different substances and product sources under investigation
- Specific chemical exposure(s) causing these lung injuries remains unknown at this time
If use of e-cigarette, or vaping, product suspected as possible cause for a patient’s lung injury, obtain a detailed history of:

- Substance(s) used
- Substance source(s)
- Device(s) used
- Where products were purchased
- Method of substance use
RECOMMENDATIONS FOR HEALTHCARE PROVIDERS

- Consider all possible causes in patients reporting respiratory and gastrointestinal symptoms
- Patients with suspected lung injury should be admitted if decreased oxygen (O2) saturation (<95%)
- Long-term effects of and recurrence risk unknown
Recommendations for Healthcare Providers

- Close follow-up needed for these patients
  - After discharge: Follow-up visit recommended no later than 1-2 weeks
  - Outpatient: Follow-up within 24-48 hours
- Advise patients to discontinue use of e-cigarette, or vaping, products
  - Cessation might speed recovery
  - Resuming use has potential to cause recurrence of symptoms or lung injury
- Encourage evidence-based tobacco product cessation strategies
RECOMMENDATIONS FOR THE PUBLIC

- CDC recommends people should:
  - **Not** use e-cigarette, or vaping, products that contain THC
  - **Not** buy these products off the street
  - **Not** modify or add any substances to these products
  - Since specific cause or causes of lung injury are not yet known,
    - only way to assure that you are not at risk is to consider refraining from **all** e-cigarette, or vaping products.
RECOMMENDATIONS FOR THE PUBLIC

- If you continue to use an e-cigarette, or vaping, product and you have symptoms of lung injury,
  - See a healthcare provider
- If you are an adult who uses e-cigarettes because you have quit cigarette smoking,
  - Do not return to smoking cigarettes
- Youth, young adults, and women who are pregnant should not use e-cigarette, or vaping, products
- For questions, contact 1-800-CDC-INFO
<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>What Are They?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Why Are They Popular?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Who's Using Them?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Are They Safe?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>What Can We Do About It?</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
PUBLIC HEALTH ACTIONS TO ADDRESS E-CIGARETTES

- **Federal Regulation**
  - **Family Smoking Prevention and Tobacco Control Act**
    - Signed into law on June 22, 2009
    - Granted FDA the authority to regulate tobacco products
    - Enhanced the ability to intensify policy to reduce tobacco industry influence:
      - Manufacturing
      - Marketing
      - Sale

- **State, Local, Territory**
  - **Potential Sub-National Action:**
    - Including e-cigarettes in smokefree indoor air policies
    - Restricting youth access to e-cigarette in retail settings
    - Licensing retailers
    - Establishing specific package requirements
    - Setting price policies
SURGEON GENERAL’S ADVISORY ON E-CIGARETTE USE AMONG YOUTH

It’s not like you can buy a new brain.

https://e-cigarettes.surgeongeneral.gov/
Including with Statewide T21 Laws

500+ Cities & Counties in 30 States

You have an important role to play in addressing this public health epidemic.

- Learn about the different shapes and types of e-cigarettes and the risks of all forms of e-cigarette use, including JUUL, for young people at https://e-cigarettes.surgeongeneral.gov/.
- Ask about e-cigarettes, including small, discreet devices such as JUUL, when screening patients for the use of any tobacco products.
- Educate patients about the risks of all forms of tobacco product use, including e-cigarettes, for young people.
- Encourage patients to quit. For free help, patients can visit smokefree.gov or call-800-QUIT-NOW.
E-cigarettes are a tobacco product that produces an aerosol by heating a liquid that typically contains nicotine, flavorings, and other chemicals.

Several factors have contributed to the popularity of e-cigarettes, including advertising and the vast array of available flavors.

E-cigarette use is higher among young people than adults. As of 2014, e-cigarettes were the most commonly used tobacco product among U.S. youth.

Youth use of e-cigarettes is unsafe. Adult smokers must completely quit to realize benefits from e-cigarettes.

As the tobacco product landscape continues to diversify, it’s important to modernize tobacco control strategies to adapt.