Vaping: Basics for Health Educators

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Learning Objectives

• What are electronic cigarettes?
• How do the devices work?
• What chemicals are in the vaping liquid?
• What are the trends in vaping?
• What are the potential health consequences?
• What are the New York State regulations?
• What are some strategies to help youth avoid and or quit vaping?
Electronic Cigarettes (E-Cigs)

- devices that use a battery to aerosolize a liquid, usually containing nicotine, flavoring, and other additives, which is inhaled by the user through a mouthpiece.
- known by a variety of names: e-cigs, e-hookahs, vape pens, tank systems, and mods
- can also be used to deliver marijuana and other substances
- using one is sometimes called “vaping”
E- "terminology"

- Vaping
- JUUL’ing
- Ghosting
- Cloud Chasing
- Vape God / Goddess
- E-cigs
- Vape pens
- Vapes
- Pods
- E-hookahs
- Mods

Source: E-cigarette Use and Youth: Updated for healthcare providers. Risa Turetsky
What do E-Cigs look like?

May look like:

• regular cigarettes, cigars, or pipes

• larger e-cigarettes: tank systems or “mods”

• other items used by youth: pens, USB flash drives
WHAT DO E-CIGARETTES LOOK LIKE?

**NOT** FDA-approved for cessation

Source: E-cigarette Use and Youth: Updated for healthcare providers. Risa Turetsky

Source: CDC
THIS IS NOT A FLASH DRIVE.

What is it?

Source: E-cigarette Use and Youth: Updated for healthcare providers. Risa Turetsky
Stealth Vaping
Stealth Vaping Gear
How do E-Cigarettes work?

- **Mouthpiece**: a cartridge that is fixed to the end of a tube
- **Atomizer**: a heating element that heats the liquid, causing it to aerosolize, which is then inhaled
- **Battery**: powers the heating element; normally a rechargeable
- **Sensor**: activates the heater when the user sucks on the device. An LED may show when it is activated
- **Solution**: made by extracting nicotine from tobacco and mixing it with a base, usually propylene glycol, and flavoring
Anatomy of a Pod-Based E-Cig

These cartridges/pods do contain NICOTINE!

Devices with Rechargeable Battery

Covers
How e-cigarettes work

- LED indicator
- Rechargeable battery
- Voltage control
- Atomiser
- Vaporising chamber
- Heating coil
- Nicotine cartridge
What is in the vaping liquid?

Each pod is equivalent to 1 pack of cigarettes or 200 puffs

WARNING:
This product contains nicotine. Nicotine is an addictive chemical.
In 2014, 460 brands and 7,764 unique flavors

- Vaping
- JUUL’ing
- Ghosting
- Cloud Chasing
- Vape God / Goddess
- Clouds
- E-juice
- E-liquid
- Vape juice
- Vape shop
- E-cigs
- Vape pens
- Vapes
- Pods
- E-hookahs
- Mods

Source: E-cigarette Use and Youth: Updated for healthcare providers. Risa Turetsky
Marketing

Appealing flavors

>2/3 of young tobacco users said they use tobacco because “it comes in flavors I like”

Source: E-cigarette Use and Youth: Updated for healthcare providers. Risa Turetsky NP
Chemicals Found in E-Cig/Pod-Based Aerosol?

<table>
<thead>
<tr>
<th>Compounds</th>
<th>FDA 2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Propylene glycol</td>
<td></td>
</tr>
<tr>
<td>Glycerin</td>
<td></td>
</tr>
<tr>
<td>Flavorings (many)</td>
<td></td>
</tr>
<tr>
<td>Nicotine</td>
<td></td>
</tr>
<tr>
<td>NNN</td>
<td></td>
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<tr>
<td>NNK</td>
<td></td>
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<tr>
<td>NAB</td>
<td></td>
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<tr>
<td>NAT</td>
<td></td>
</tr>
<tr>
<td>Ethylbenzene</td>
<td></td>
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<tr>
<td>Benzene</td>
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<tr>
<td>Xylene</td>
<td></td>
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<tr>
<td>Toluene</td>
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<tr>
<td>Acetaldehyde</td>
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<tr>
<td>Formaldehyde</td>
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<tr>
<td>Naphthalene</td>
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<tr>
<td>Styrene</td>
<td></td>
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<tr>
<td>Benzo(b)fluoranthene</td>
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<tr>
<td>Chlorobenzene</td>
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<tr>
<td>Crotonaldehyde</td>
<td></td>
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<tr>
<td>Propionaldehyde</td>
<td></td>
</tr>
<tr>
<td>Benzaldehyde</td>
<td></td>
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<tr>
<td>Valeric acid</td>
<td></td>
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<tr>
<td>Hexanal</td>
<td></td>
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<tr>
<td>Fluorine</td>
<td></td>
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<tr>
<td>Benzo(ghi)perylenearle</td>
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<tr>
<td>Acetone</td>
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<tr>
<td>Acrolein</td>
<td></td>
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<tr>
<td>Silver</td>
<td></td>
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<tr>
<td>Nickel</td>
<td></td>
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<td>Tin</td>
<td></td>
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<tr>
<td>Sodium</td>
<td></td>
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<tr>
<td>Cadmium</td>
<td></td>
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<tr>
<td>Silicon</td>
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<tr>
<td>Lithium</td>
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<tr>
<td>Lead</td>
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<td>Magnesium</td>
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<td>Manganese</td>
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<td>Potassium</td>
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<td>Titanium</td>
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<td>Zinc</td>
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<td>Zirconium</td>
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<td>Calcium</td>
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<tr>
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<tr>
<td>Sulfur</td>
<td></td>
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<tr>
<td>Vanadium</td>
<td></td>
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<tr>
<td>Cobalt</td>
<td></td>
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<tr>
<td>Rubidium</td>
<td></td>
</tr>
</tbody>
</table>

All of these have been found in e-cigarette/pod-based aerosol

Compounds in **orange** are from FDA 2012, Harmful and Potentially Harmful Substances – Established List
VOLATILE ORGANIC COMPOUNDS

ULTRAFINE PARTICLES

HEAVY METALS SUCH AS NICKEL, TIN, AND LEAD

CANCER-CAUSING CHEMICALS

NICOTINE

FLAVORING SUCH AS DIACETYL, A CHEMICAL LINKED TO A SERIOUS LUNG DISEASE
What is in the vaping liquid?

- **Salt-based nicotine**
  - 41.3-68 milligrams of nicotine

- **Freebase nicotine**
  - 25 milligrams of nicotine

Source: tobaccopreventiontoolkit.stanford.edu
Youth: My friends use e-cigarettes that don’t have any nicotine in them.

Nicotine is very common in e-cigarettes, and e-cigarettes may not be labeled to accurately show their ingredients. Nicotine is very addictive and can harm your brain.

Source: https://e-cigarettes.surgeongeneral.gov/
The aerosol that’s created when an e-cigarette heats up the e-liquid is not just water vapor, it is aerosol.

A *vapor* is a substance in the gas phase; an *aerosol* is a suspension of tiny particles of liquid, solid or both within a gas.

The aerosol is not harmless either for users or for others who are exposed to it secondhand.

Besides nicotine, which is harmful to young people’s health on its own, heavy metals that can cause respiratory distress and disease have been found in e-cigarette aerosol.

Chemicals that are known to cause cancer and that have been linked to lung disease can also be present in e-cigarette aerosol.
Youth: I’ve heard e-cigarettes are less harmful than regular cigarettes.

- E-cigarettes can contain harmful and potentially harmful ingredients, including nicotine.
- Some of the other chemicals in e-liquids and in the aerosol from e-cigarettes are known to cause cancer in humans.
- Heavy metals such as lead and cadmium that have been found in e-cigarette aerosol can cause respiratory distress and disease.
- Some of the chemicals that flavor e-cigarettes are harmful when they are inhaled, even though they’ve been approved for ingestion. One of them, diacetyl, is used to produce a buttery flavor but has been linked to a serious and permanent lung disease called “popcorn lung.”

Source: https://e-cigarettes.surgeongeneral.gov
TEEN VAPING CLIMBS SIGNIFICANTLY*

*Both Nicotine and Marijuana (THC)

DAILY NICOTINE VAPING
Measured for the first time in 2019

- 8th graders: 1.9%
- 10th graders: 6.9%
- 12th graders: 11.7%

NICOTINE VAPING
Past month use

- 8th graders: 9.6%
- 10th graders: 19.9%
- 12th graders: 25.5%


2019 Past Month Nicotine Vaping Equates to:

**1 IN 4** – 12TH GRADERS  •  **1 IN 5** – 10TH GRADERS  •  **1 IN 10** – 8TH GRADERS

TEEN VAPING CLIMBS SIGNIFICANTLY*

THC VAPING
Past month use

<table>
<thead>
<tr>
<th>Year</th>
<th>8th graders</th>
<th>10th graders</th>
<th>12th graders</th>
</tr>
</thead>
<tbody>
<tr>
<td>2017</td>
<td>3.9%</td>
<td>12.6%</td>
<td>14%</td>
</tr>
<tr>
<td>2018</td>
<td>8th graders</td>
<td>10th graders</td>
<td>12th graders</td>
</tr>
<tr>
<td>2019</td>
<td>0.8%</td>
<td>3.0%</td>
<td>3.5%</td>
</tr>
</tbody>
</table>

Daily THC Vaping
Measured for the first time in 2019


To view information on other drugs from the 2019 Survey visit:
TOBACCO AND NICOTINE: VAPEING THREATENS PROGRESS

NICOTINE - DAILY USE

Daily Smoking
- Daily Nicotine Vaping measured for the first time in 2019

<table>
<thead>
<tr>
<th>Grade</th>
<th>2009</th>
<th>2014</th>
<th>2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>8th grader</td>
<td>0.8%</td>
<td>1.3%</td>
<td>1.9%</td>
</tr>
<tr>
<td>10th grader</td>
<td>6.9%</td>
<td>2.4%</td>
<td>2.4%</td>
</tr>
<tr>
<td>12th grader</td>
<td>11.7%</td>
<td>5.7%</td>
<td>3.4%</td>
</tr>
</tbody>
</table>

*Significant decline from 2018 (3.6%)

CIGARETTE SMOKING (PAST MONTH) DECLINES OVER PAST TEN YEARS

<table>
<thead>
<tr>
<th>Year</th>
<th>8th Graders</th>
<th>10th Graders</th>
<th>12th Graders</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>5.7%</td>
<td>3.4%</td>
<td>2.3%</td>
</tr>
<tr>
<td>2014</td>
<td>5.7%</td>
<td>3.4%</td>
<td>2.3%</td>
</tr>
<tr>
<td>2019</td>
<td>5.7%</td>
<td>3.4%</td>
<td>2.3%</td>
</tr>
</tbody>
</table>

*Significant decline from 2018 (7.6%)

TO VIEW MORE RESULTS ON VAPEING VISIT:

NIH National Institute on Drug Abuse

DRUGABUSE.GOV
Percent of Students Reporting Marijuana, Cigarette, Vape Use in Past Month, 12th Grade

- Cigarettes
- Marijuana
- Vape Nicotine
- Vape Marijuana

*Significant increase or ^significant decline compared to the 2018 MTF Survey.
7 out of 10 middle and high school students who currently use tobacco have used a **FLAVORED** product.

- **63%** of students who currently use e-cigarettes have used **flavored** e-cigarettes. (1.6 million)
- **61%** of students who currently use hookah have used **flavored** hookah. (1 million)
- **64%** of students who currently use cigars have used **flavored** cigars. (910,000)

Source: Morbidity and Mortality Weekly Report (MMWR)
TEEN E-CIG USERS ARE MORE LIKELY TO START SMOKING.²

Start Smoking Within 6 Months

<table>
<thead>
<tr>
<th>E-CIG USER</th>
<th>NON USER</th>
</tr>
</thead>
<tbody>
<tr>
<td>30.7%</td>
<td>8.1%</td>
</tr>
</tbody>
</table>

*Includes combustible tobacco products [cigarettes, cigars, and hookahs]

WHAT DO TEENS SAY IS IN THEIR E-CIG?³

- 66.0% Just Flavoring
- 13.2% Nicotine
- 5.8% Marijuana
- 13.7% Don’t Know
- 1.3% Other

Manufacturers don’t have to report e-cig ingredients, so users don’t know what’s actually in them.
Patient: I thought e-cigarettes were used to help people quit smoking.

The evidence isn’t clear on whether e-cigarettes help people quit smoking regular cigarettes, but we already know that e-cigarette use is a health risk for young people. For example, nicotine can harm brain development, and your brain continues developing until around age 25.
Health Effects

Source: E-cigarette Use and Youth: Updated for healthcare providers. Risa Turetsky
Vaping: Potential health consequences

- Nicotine & the adolescent brain
- Toxins, carcinogens, respiratory impact
- Contaminants, “vaping illness” cause?
- Exposure: Second-hand “vapor”, prenatal, ingestion
- Increased risk of cigarette smoking & long-term addiction

Source: E-cigarette Use and Youth: Updated for healthcare providers. Risa Turetsky
Vaping: Potential health consequences

- Most e-cigarettes contain nicotine, which is highly addictive.
- Nicotine exposure during adolescence can
  - harm brain development
  - impact learning, memory, and attention
  - increase the risk for future addiction to other drugs
Vaping: Potential health consequences

- Nicotine & the adolescent brain
- Toxins, carcinogens, respiratory impact
- Contaminants, “vaping illness” cause?
- Exposure: Second-hand “vapor”, prenatal, ingestion
- Increased risk of cigarette smoking & long-term addiction

Source: E-cigarette Use and Youth: Updated for healthcare providers. Risa Turetsky
Patient: I’ve heard there are other risks from e-cigarettes.

• Nicotine found in many e-cigarettes is unsafe for pregnant women and fetuses. It can complicate pregnancy and cause health issues for the baby. Nicotine is known as a cause of sudden infant death syndrome.

• The liquid for e-cigarettes can contain high enough levels of nicotine to cause nicotine poisoning if it’s ingested or absorbed through the skin. It’s especially dangerous for young children, who may be attracted to the liquid because of the flavors and bright colors.

• E-cigarette batteries have been known to explode and cause burns and other injuries.

• The heating element in e-cigarettes can cause burns.
E-cigarette liquid caused **high rates of lung cell death & inflammation**, potential to cause overactive pulmonary immune responses via inflammasome activation (*in vitro*), **flavors especially**¹

E-cigarette use causes **unique innate immune response in the lungs** via activation of neutrophils, altered mucin secretion²

“Chronic vaping exerts **marked biological effects on the lung**”³

E-cigarette users had increased likelihood of:

- **34% heart attack**
- **25% coronary artery disease**
- **55% depression or anxiety**.⁴

Contamination - **traces of endotoxin (27%) & glucan (81%)**⁵

Source: E-cigarette Use and Youth: Updated for healthcare providers. Risa Turetsky NP


4. E-Cigarettes Linked to Heart Attacks, Coronary Artery Disease and Depression accessed from [www.acc.org](http://www.acc.org)

Second vaping-related death in Kansas brings nationwide total to 9

By Jen Christensen and Jamie Gumbrecht, CNN

Updated 6:27 AM ET, Tue September 24, 2019
Take Aways - Key Points for Talking to Teens

**Important Points:**

Understand WHY they are vaping.

Get real facts, connect with resources.

Reset the Norms - not everyone is doing it.

Focus on the Positives.

*Again, start by listening!*
New York State Vaping-Related Illness Investigation
Summary of case data reported to NYS Department of Health through February 25, 2020

Total reported cases = 249
Vaping Related Illness: Case Report by County

Probable and Confirmed Cases

- **40 and up**
- **20 to 39**
- **10 to 19**
- **5 to 9**
- **1 to 4**
- **no cases**

* cases under investigation

Updated 02/24
New York State Regulations

• The Clean Indoor Air Act was expanded to include e-cigarettes in 2017
• A tax of 20% of retail price is imposed on all vapor products
• Liquid nicotine ("electronic liquid") must be sold in a child resistant bottle
• The purchase age for tobacco & nicotine was increased to 21 years in 2019
• New York State banned the sale of flavored e-cigarettes, but the State has been barred from enforcing the ban, pending a ruling on that litigation
• New services for e-cigarette users seeking help to stop vaping, including free quit-coaching and nicotine replacement therapy through the New York State Smokers' Quitline

NYS regulations on vaping/products

E-cigarette use prohibited where smoking is prohibited including, but not limited to indoor areas such as workplaces, restaurants, mass transit, hospitals, schools and dorms, and outdoor areas, such as railroad stations, hospital, library and school grounds (with some exceptions) and most playgrounds.

Source: https://publichealthlawcenter.org/resources/us-e-cigarette-regulations-50-state-review/ny
Prevention and Cessation
TEEN VAPE CLIMBS SIGNIFICANTLY*

TEENS REPORT REASONS FOR VAPEING

*Up significantly from 2018

To view information on other drugs from the 2019 Survey visit:

NIH National Institute on Drug Abuse

DRUGABUSE.GOV
1. Reflect

Reflect on your personal point of view

Reflect on your ability to be a role model

Reflect on what you want the result of the conversation to be

Reflect on the context of the conversation
2. Determine Underlying Question

“Am I normal?”

“What is acceptable behavior?”

“Do I have your approval?”

“Can I shock you?”

“What is your personal belief?”
3. Use O.A.R. to Guide the Conversation

- Open-ended questions
- Affirmations
- Reflective Listening
O.A.R.: Open-ended Questions

“Do any of your friends JUUL?”

“If your friends wanted to try JUULs, how would you handle that?”

“You know people who vape aren’t living up to their potential, right?”

“How might vaping impact your ability to do well in school or at sports?”

“Don’t you want to make your own decisions, not follow your friends?”

“How might you have a conversation with your friends about how their use impacts you?”
O.A.R.: Affirmations

Statements to focus on strengths and positive behaviors – no matter how small.

Examples:

“I appreciate that you’re willing to talk with me about this.”

“You are clearly a very resourceful person.”

“It sounds like you handled yourself well in that situation.”

“That’s a good idea.”
Take Aways - Key Points for Talking to Teens

Important Points:

Understand WHY they are vaping.

Get real facts, connect with resources.

Reset the Norms - not everyone is doing it.

Focus on the Positives.

Again, start by listening!
Resources: for health educators and parents:

**CDC has updated pages;** they are in English and Spanish (and now with handouts in Spanish). They have information on e-cigarettes in general as well as about the recent vaping illness.

The CDC section on lung illness is [at this site](#), and if you scroll down to “key resources” there are info sheets for parents (then switch to Spanish at the top).

**US Surgeon General's Tip Sheet for Parents**

**Partnership for Drug Free Kids' guide for parents on vaping**

**Partnership for Drug Free Kids' info on vaping marijuana.**

"Speak Now" resources on how to talk to kids about substances, even broken down by age group.

**Videos - video for teens and adults (from UCLA**
"still blowing smoke" has good info for teens, especially about the impact of vaping on their brains.

Truth’s **text to quit** program - teens can just text DITCHJUUL to 88709 to participate in a semi-interactive text service.

There’s also [My Life My Quit](#) from National Jewish which does offer an interactive text to learn more / quit service.

For older teens, articles: [article from the Boston Globe](#), by young people, for young people; [article from Men’s Health](#) by a cigarette to e-cigarette converter is helpful.
Curriculum for Youth

The Stanford toolkit for e-cigarettes.
Ready to Quit? Just want to learn more?