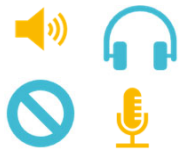
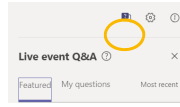


- Welcome and thank you for joining us.
- There is audio as part of this presentation. Please use headphones if in public settings.
- Even if your sound is on, and you are unmuted, you will not be heard on the call.
- We will be using the Q&A feature to the right of the screen for attendance for those who signed in anonymously. Please type "here" and your full name.
- Please also use the Q&A feature to type in poll answers, and your questions. Questions will be viewed by the moderator, and answered at the end of the presentation.
- The speakers will take turns presenting. As we switch from one speaker to the other, there may be slight delays. The speaker and presentation slide will reappear.

1



The Evolution of Vaping Among Adolescents
Stacey Engster, MD, MS & Shannon Meyers, RN-BC

2

Objectives

1. To list the components of e-cigarettes and recent changes in product types
2. Discuss recent trends in adolescent e-cigarette use
3. To discuss the known and potential risks of e-cigarettes, vape devices, and JUUL
4. To describe methods to screen, counsel, and treat patients using e-cigarettes

3

Components of E-cigarettes

As Advertised	As found
<ul style="list-style-type: none">• Humectant• Flavoring• +/- Nicotine	<ul style="list-style-type: none">• Nicotine• Ultrafine particles• Toxicants• Carcinogens• Metallic nanoparticles (nickel, tin, and lead)• Volatile organic compounds• +/- psychoactive ingredients

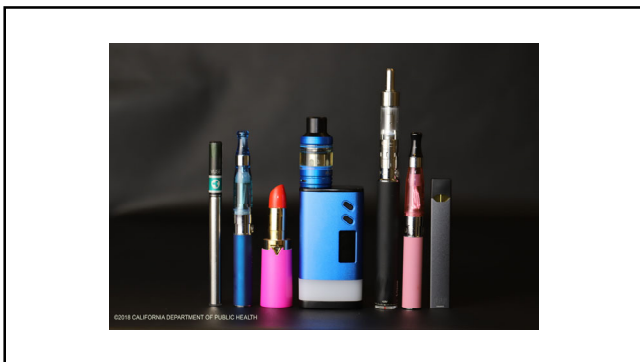
4

Evolution of E-cigarettes

- First Generation**
 - Similar to cigarettes ("cig-a-likes" or "minis")
 - Disposable or rechargeable
- Second Generation**
 - Vape pens and mid-sized e-hookah
 - Refillable with e-liquid
- Third Generation**
 - Modified Nicotine Delivery System (MODs)/Vape MODs
 - Larger in size and battery capacity, rechargeable

<https://www.centeronaddiction.org/e-cigarettes/recreational-vaping/what-parents-should-know-about-different-vaping-devices>

5



6

Vaping Quiz
True or False



1. One JUUL pod has the same amount of nicotine as one pack of traditional cigarettes.

True

7

JUUL

- Resembles USB flash drive
- Sleek design can be hidden from parents/teachers
- Rechargeable on a laptop or USB charger
- 5% nicotine = 59mg/mL vs 3% nicotine = 35mg/mL
- Flavors: Classic Tobacco, Menthol, Virginia Tobacco
- 1 cigarette = about 1mg nicotine (absorbed)
- 20 cigarettes per pack = 20mg nicotine
- JUUL pods contain 0.7mL of liquid
- 5% pod = 4.0mg nicotine = 2 packs cigarettes
- 3% pod = 2.3mg nicotine = 1 pack cigarettes

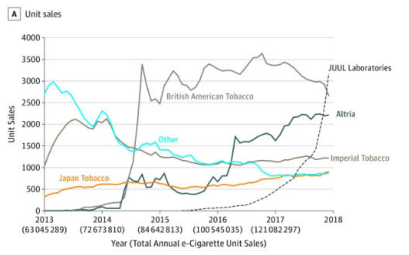



www.juul.com

8

JUUL sales rose exponentially between 2013 and 2018

BAT – Vuse
Imperial – Blu
Japan Tobacco – Logic, Ploom
Altria – MarkTen, Green Smoke
35% JUUL stake



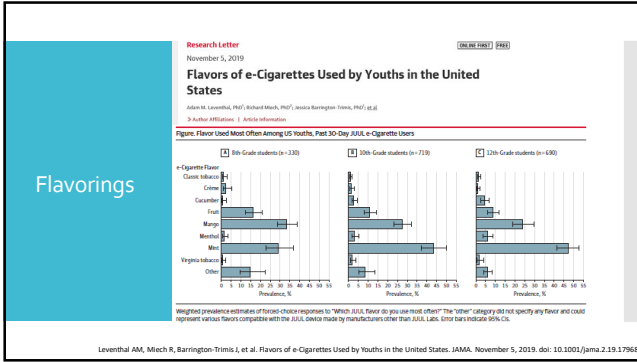
Unit sales

Year (Total Annual e-Cigarette Unit Sales)

2013 (63,045,289) 2014 (72,673,810) 2015 (84,642,813) 2016 (100,545,035) 2017 (121,082,297) 2018

King BA Gammon DG, Marynak KL, et al. Electronic Cigarette Sales in the United States, 2013-2017. JAMA 2018; 320(13):1379-1380. doi:10.1001/jama.2018.10488

9



10

Vaping Quiz
True or False

2. E-cigarette flavor does not affect how much or how often adolescents vape.

False

11

Flavorings

PEDIATRICS
OFFICIAL JOURNAL OF THE AMERICAN ACADEMY OF PEDIATRICS

Flavored E-cigarette Use and Progression of Vaping in Adolescents

Adam M. Leventhal, Nicholas L. Goldenson, Jonathan Cho, Matthew G. Kirkpatrick, Rob S. McConnell, Matthew D. Stone, Rania D. Pang, Janet Australian-McGovern, and Joseph A. Barrington-Trimmis

Use of e-cigarettes in nontraditional flavors (versus only tobacco, mint or menthol, or flavorless) was positively associated with vaping continuation (6- 3% vs 4.2, 9%; adjusted odds ratio = 3.76 [95% confidence interval 1.20 to 10.33]) and past-30-day number of puffs per nicotine vaping episode (mean: 3.1 [SD 5.5] vs 1.5 [SD 3.8]; adjusted rate ratio = 2.41 [95% confidence interval 1.08 to 5.92]) 6 months later.

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JUUL Stopped Selling Nontraditional Flavors

- October 2019: JUUL stopped selling all flavors except mint, menthol, and tobacco
- November 2019: JUUL will only sell "Virginia Tobacco, Classic Tobacco and Menthol flavors in the United States."

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Breakout 1

Practice talking to each of the following people about the components of e-cigarettes and recent changes in product types:

- Colleague
- Parent
- Adolescent

14

Objectives

1. To list the components of e-cigarettes and recent changes in product types
2. Discuss recent trends in adolescent e-cigarette use
3. To discuss the known and potential risks of e-cigarettes, vape devices, and JUUL
4. To describe methods to screen, counsel, and treat patients using e-cigarettes

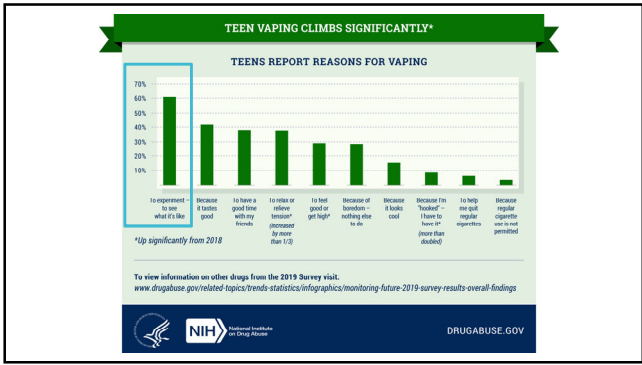
15

Vaping Quiz
True or False

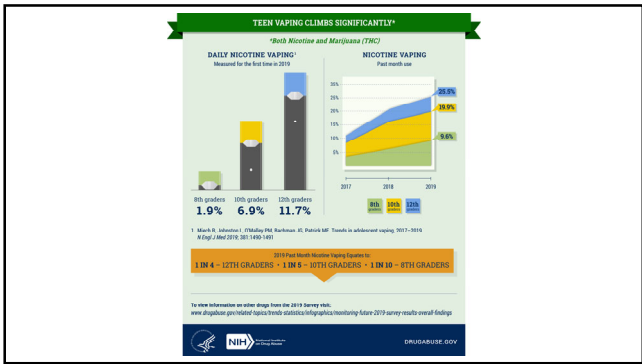
3. The number one reason adolescents report vaping is to relax or relieve tension.

False

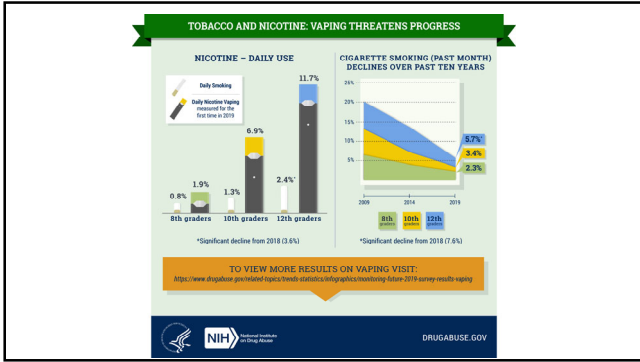
16



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18



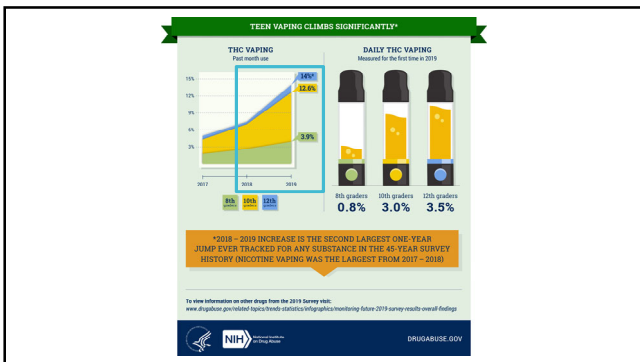
19

Vaping Quiz
True or False

4. The number of adolescents vaping THC decreased over the past year.

False

20



21

Frequent Users are Increasing

High school e-cigarette users are using them more often.

2017 20% 2018 28%

Use more than 20 days in the past 30 days

<https://www.fda.gov/tobacco-products/youth-and-tobacco/youth-tobacco-use-results-national-youth-tobacco-survey>

22

Breakout 2

Practice talking to each of the following people about the recent trends in adolescent e-cigarette use.

- Colleague
- Parent
- Adolescent

23

Objectives

1. To list the components of e-cigarettes and recent changes in product types
2. Discuss recent trends in adolescent e-cigarette use
3. To discuss the known and potential risks of e-cigarettes, vape devices, and JUUL
4. To describe methods to screen, counsel, and treat patients using e-cigarettes

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Vaping Quiz
True or False

5. Adolescents who use e-cigarettes are less likely to also use regular cigarettes.

False


25

E-cigarettes can lead to traditional cigarettes

Meta-analysis of 7 cohort studies

Adolescents and young adults are at higher risk of transitioning to traditional cigarettes

Adolescents and young adults aged 14-30 years who have used e-cigarettes are 3.6 times more likely to report using traditional cigarettes at follow-up



INITIATION AND CESSATION

Conclusion 16-1: There is substantial evidence that e-cigarette use increases risk of ever using combustible tobacco cigarettes among youth and young adults.

Soneji S, Barrington-Trimis JL, Willis TA, et al. Association between initial use of e-cigarettes and subsequent cigarette smoking among adolescents and young adults: a systematic review and meta-analysis. JAMA Pediatrics. 2017;171(8):788-797.pmid:28654986

26

High Levels of Nicotine

- E-cigarettes can deliver higher levels of nicotine than traditional cigarettes.
- Pod system e-liquids (including JUUL) – can contain up to 59 mg of nicotine per mL!
- 63% of JUUL users do not know that the product always contains nicotine

Report of the Surgeon General. (2016)Ouell AK et al. Research in Toxicology (2018), Willett JS. Tobacco Control(2018) www.juul.com

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MR SALT-E

Nicotine Salts

- Nicotine salts = free base nicotine + benzoic acid
- Nicotine salts allow nicotine to be delivered at high concentrations without throat irritation
- Commonly called "Salt Nic"



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Different
Experiences
By Users

Nicotine available per puff depends on:

- Temperature of atomizer
- How much juice atomized
- Size of atomized droplets
- Depth of the puff
- Concentration of e-juice

Wide variability in vaping behavior:

- Puff duration: 1.8 +/- 0.9s
- Puff volume: 70 +/- 68 ml
- Puffs/session: 15 +/- 6




Goniewicz, et al. Nicotine and Tobacco Research 2013

29

E-cigarette
Aerosols

- Inhalation of ultrafine particles deep into the lung
- Exposure to heavy metals in e-cigarette (nickel, lead, tin)
- Exposure to volatile organic compounds (benzene which is found in car exhaust)
- Chemicals linked to serious lung disease (diacetyl in flavorings)
- Still working to understand the health effects of these contents when heated and turned into aerosol for first and secondhand smoke



<https://e-cigarettes.surgeongeneral.gov/knowtherisks.html#risks>

30

Vaping Quiz
True or False

6. The majority of people with e-cigarette vaping associated lung injuries (EVALI) report vaping THC products.

True

31

E-cigarette, or Vaping, product use Associated Lung Injury (EVALI)


- Symptoms:
 - cough, shortness of breath, or chest pain
 - nausea, vomiting, or diarrhea
 - fatigue, fever, or weight loss
- "No evidence of infectious diseases...lung illnesses are likely associated with a chemical exposure."
- Many patients report use of cannabinoid/THC in e-cigarette.
- The CDC found a link: EVALI and vitamin E acetate - detected in all 29 bronchoalveolar lavage fluid samples.
- "Many different substances and product sources are still under investigation, and it may be that there is more than one cause of this outbreak."

Schier JG, et al. Severe Pulmonary Disease Associated with Electronic-Cigarette-Product Use — Interim Guidance. MMWR Morb Mortal Wkly Rep. ePub: 6 September 2019.

32

EVALI

- As of November 7, 2019: 20 cases have been reported among Allegheny County residents, with 14 confirmed, 4 probable, and 2 still under investigation. These cases range in age from 17 to 34 years, and most (85%) are male. All have been hospitalized, with 6 in and ICU. Almost all (90%) report vaping THC products within the past 90 days.
- Nationwide 2,172 cases (confirmed and probable) and 42 deaths have been reported to CDC as of Nov 14.
- Nationally, the majority of cases (86%) report vaping THC products.



www.cdc.gov, Alleghenycounty.us

33

Some E-cigarette Users Are Having Seizures

- Between 2010 and early 2019, the FDA determined that, between the poison control centers and the FDA, there were a total of 35 reported cases of seizures mentioning use of e-cigarettes
- Seizures are potential side effects of nicotine toxicity
 - Intentional or accidental swallowing of e-liquid
 - Recent uptick in voluntary reports of adverse experiences with tobacco products that mentioned seizures occurring with e-cigarette use (e.g., vaping) signal a potential emerging safety issue

<https://www.fda.gov/tobacco-products/ctp-newsroom/some-e-cigarette-users-are-having-seizures-most-reports-involving-youth-and-young-adults>

34

Heart problems

- Two studies indicate that vaping is just as harmful, or possibly more harmful, for the heart than smoking.
- Higher levels of unhealthy LDL cholesterol, on average, compared with nonsmokers, and levels of healthy HDL cholesterol were lower among people who used both traditional and e-cigarettes
- Heart's "ability to pump blood was diminished both during exercise and rest" in vapers rather than just during exercise as was the case in smokers
- "People are making the assumption if they switch from cigarettes to e-cigarettes, their risk will be substantially reduced of cardiovascular disease. That's not necessarily the case."

<https://www.nbcnews.com/health/vaping/e-cigarettes-hurt-heart-health-possibly-more-regular-cigarettes-n1079076>

35

Safety Concerns


Burns

- 2,035 explosion and burn injuries seen in US Emergency Departments from 2015-2017

Poisonings

- 8,269 liquid nicotine exposures reported among children <6 from 2012-2017
- Child-resistant packaging laws associated with decreasing exposure rates (required in 2016)

E-liquid or food product?



FDA, FTC warn companies to stop misleading kids


Rosshiem ME et al. Tob Control (2018) Govindarajan P. Pediatrics (2018)

36

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POLICY STATEMENT Organizational Principles to Guide and Define the Child Health Care System and/or Improve the Health of all Children
Clinical Practice Policy to Protect Children From Tobacco, Nicotine, and Tobacco Smoke
SECTION ON TOBACCO CONTROL

November 2015

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Tobacco Use Prevention as Anticipatory Guidance

- Start early to prevent initiation (even 5-10 year olds!)
- Messages for adolescents: effects on appearance, breath, sports performance, lack of benefit for weight loss, cost, how tobacco industry deceives them
- Tobacco dependence/addiction develops quickly
- Ask patients/parents to commit to be tobacco free and identify their own reasons for being tobacco free

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Screen Parents and Teens

- Inquire about use and exposure during health supervision visits and visits for diseases that may be caused or exacerbated by tobacco
- Smoking includes cigarettes, electronic cigarettes, hookah, marijuana, etc.

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Screening Teens with S2BI

Adolescent Form – Age 11 and older

	No	Yes
1. Have you ever ridden in a CAR driven by someone (including yourself) who was "high" or had been using alcohol or drugs?	<input type="checkbox"/>	<input type="checkbox"/>
2. Do you ever use alcohol or drugs to RELAX, feel better about yourself, or fit in?	<input type="checkbox"/>	<input type="checkbox"/>
3. Do you ever use alcohol or drugs while you are by yourself, or ALONE?	<input type="checkbox"/>	<input type="checkbox"/>
4. Do you ever FORGET things you did while using alcohol or drugs?	<input type="checkbox"/>	<input type="checkbox"/>
5. Do your FAMILY or FRIENDS ever tell you that you should cut down or your drinking or drug use is a problem?	<input type="checkbox"/>	<input type="checkbox"/>
6. Have you ever gotten into TROUBLE while you were using alcohol or drugs?	<input type="checkbox"/>	<input type="checkbox"/>

In the past year, how many times have you used e-cigarettes, vape pens or JUUL?

Never Once or twice Monthly Weekly or more

What substance do you use in e-cigarettes, vape pens or JUUL? (choose all that apply)

Nicotine Marijuana or THC CBD

The following questions will ask about your use, if any, of alcohol, tobacco, and other drugs. Please answer every question by checking the box next to your choice.

IN THE PAST YEAR, HOW MANY TIMES HAVE YOU USED:

Tobacco?	Alcohol?	Marijuana?
<input type="radio"/> Never	<input type="radio"/> Never	<input type="radio"/> Never
<input type="radio"/> Once or twice	<input type="radio"/> Once or twice	<input type="radio"/> Once or twice
<input type="radio"/> Monthly	<input type="radio"/> Monthly	<input type="radio"/> Monthly
<input type="radio"/> Weekly or more	<input type="radio"/> Weekly or more	<input type="radio"/> Weekly or more

STOP if answers to all previous questions are "never." Otherwise, continue with the questions.

41

Screening Teens with S2BI

```

graph TD
    Q1[Do you use e-cigarettes, vape pens or JUUL?] -- No --> A1[Positive Reinforcement]
    Q1 -- Yes --> Q2[What substance do you use in e-cigarettes, vape pens or JUUL?]
    Q2 -- Nicotine --> Q3[How often do you use this substance?]
    Q2 -- Marijuana or THC --> Q3
    Q2 -- CBD --> Q3
    Q3 -- Once or twice --> A2[Brief Advice]
    Q3 -- Monthly --> A3[Brief Intervention]
    Q3 -- Weekly or more --> A4[Brief Intervention & Consider Referral to Treatment]
  
```

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Nicotine Replacement Therapy for Vaping

- Not Evidence-based yet
- Presented at the 2019 AAP National Conference and Exhibition as general national clinician consensus
- Gum/lozenges as needed

Amount they currently smoke per day	Starting Dose of Patch
1 + pods a day	21 mg
½ - 1 pod a day	14 mg
"A few hits a day"	7 mg

43

Vaping Quiz
True or False


7. Prescribing a nicotine patch + gum together increases success of quitting by 350% vs. no medications.

True

44

Prescribing Nicotine Replacement Therapy

- Prescribing patch+ gum together increases success of quitting by 350% vs. no medications
- Even if not willing to quit completely, use as harm reduction



45

Vaping Quiz
True or False

8. Adolescents, under age 18, are allowed to purchase Nicotine Replacement Therapy over the counter.

False

46

Youth Treatment for Tobacco Dependence

"In the United States, tobacco dependence treatment medications have not been approved by the FDA for use by people younger than 18 years. There is, however, no biological or cognitive rationale to have 18 years as the cutoff for offering effective pharmacotherapy of tobacco dependence. To legally obtain any FDA-approved tobacco dependence treatment product (including the over-the-counter products), an adolescent needs a prescription from a licensed health care provider."

Clinical Practice Policy to Protect Children From Tobacco, Nicotine, and Tobacco Smoke. SECTION ON TOBACCO CONTROL. Pediatrics 2015;136:1008 DOI: 10.1542/peds.2015-3108

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Do Not Recommend E-cigs for Tobacco Dependence Treatment

- Not FDA-approved for tobacco dependence treatment
- Mixed evidence from Randomized Controlled Trials
- Among adolescents, e-cigarette use associated with decreased rates of smoking cessation

Clinical Practice Policy to Protect Children From Tobacco, Nicotine, and Tobacco Smoke. SECTION ON TOBACCO CONTROL. Pediatrics 2015;136:1008 DOI: 10.1542/peds.2015-3108

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Breakout 4

Case Study

John is a 16-year-old boy who is being seen at your office today. You administered the S2BI screen + vaping questions and John reported vaping nicotine weekly or more. You asked John if he would like to receive some information from you about vaping and he agreed. He reports using one JUUL 3% pod every day.


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Take Home Points

1. E-cigarettes contain multiple products including nicotine, carcinogens, metallic nanoparticles, flavorings, +/- psychoactive agents.
2. The number of adolescents vaping nicotine and THC increased significantly from 2018 to 2019.
3. E-cigarette use is associated with nicotine addiction, significant lung injuries, heart problems, and neurodevelopment impacts.
4. Nicotine replacement therapy for adolescents under the age of 18 years is considered off-label by the FDA but is supported by the AAP.

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Questions?



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