



**Responding to the
adolescent vaping
epidemic:
a case-based discussion**

**Nicholas Chadi, MD MPH
FRCP(C) FAAP**

Pediatrician Specialized in
Adolescent and Addiction
Medicine

Clinical Assistant Professor of
Pediatrics

Division of Adolescent
Medicine

Sainte-Justine University
Hospital Centre

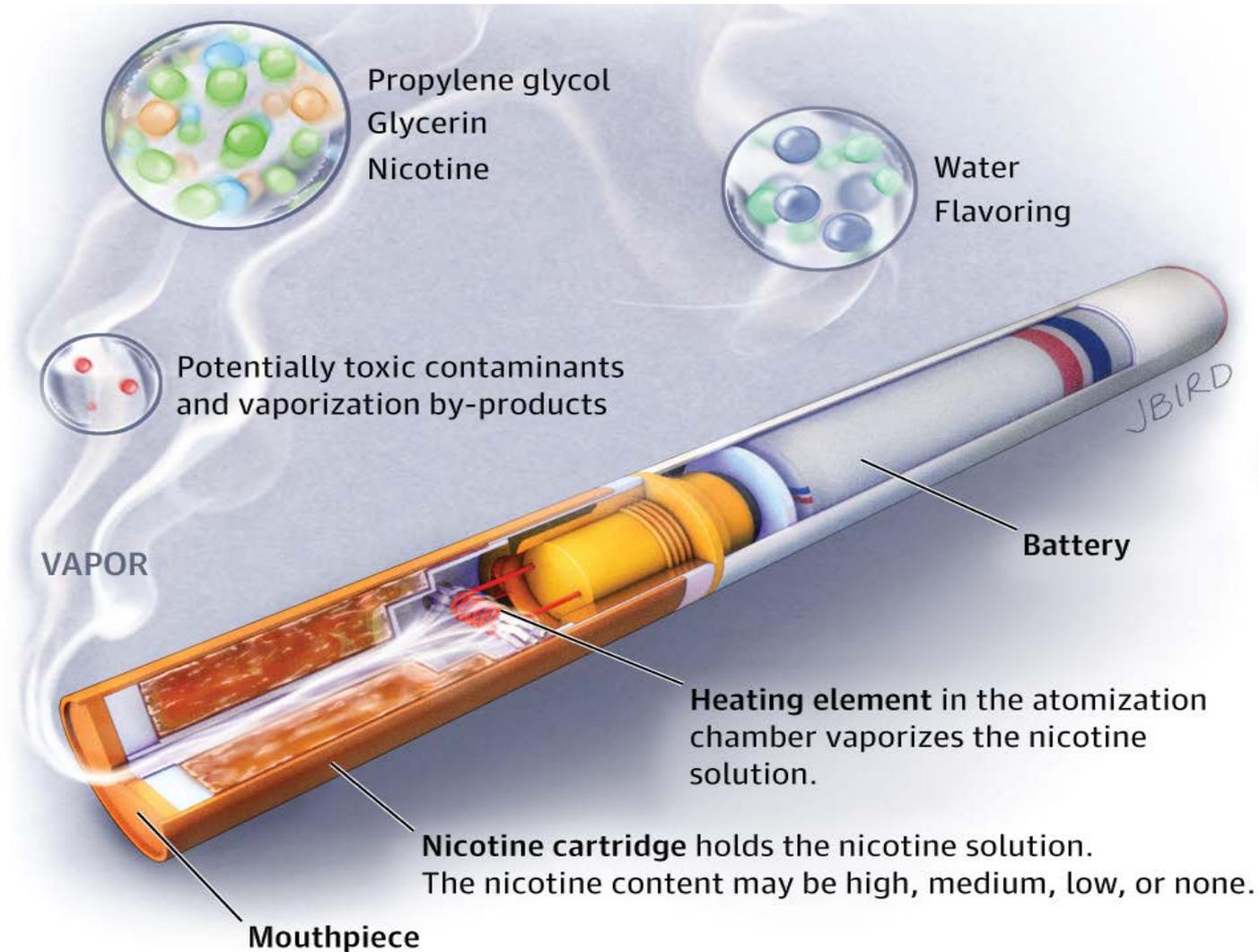
University of Montreal

September 27, 2019

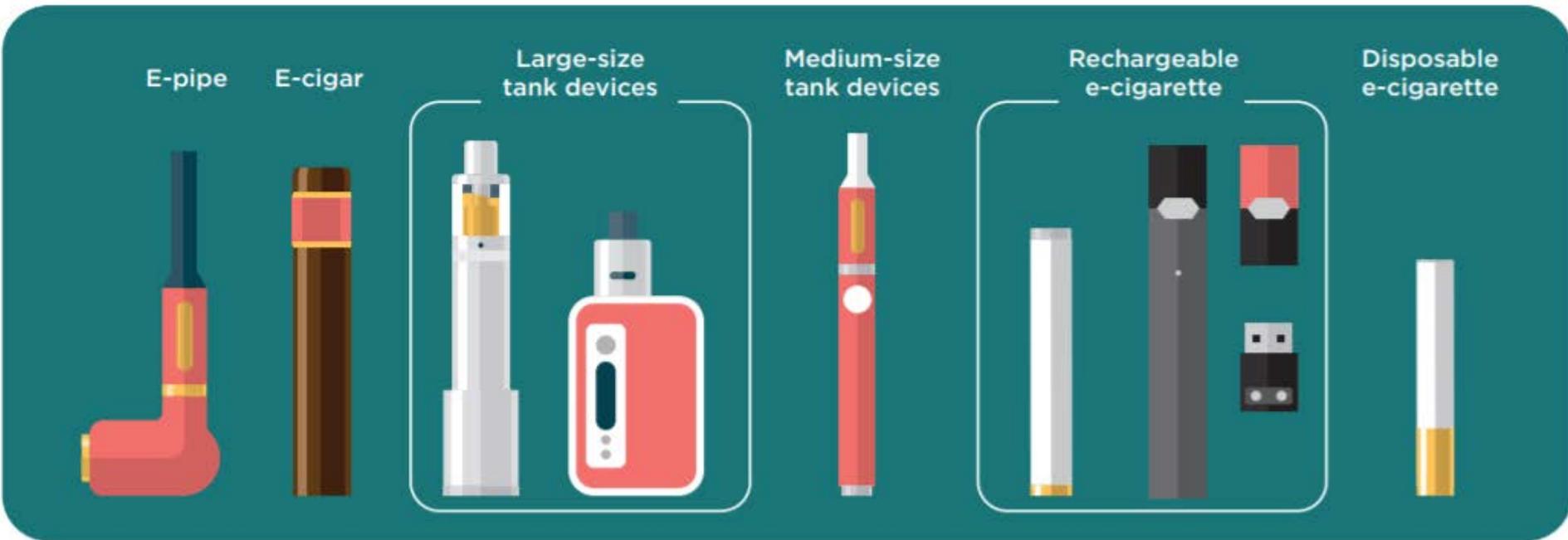
Disclosures

- None

Inside the e-cigarette...



Vaping devices/e-cigarettes



**U.S. Department of
Health and Human Services**
Centers for Disease
Control and Prevention

Jeremy

- 15 years old, high school, soccer player, oldest of three children
- Severe persistent asthma, last hospitalization 6 months ago
- Caught vaping in the bathroom at school



Jeremy

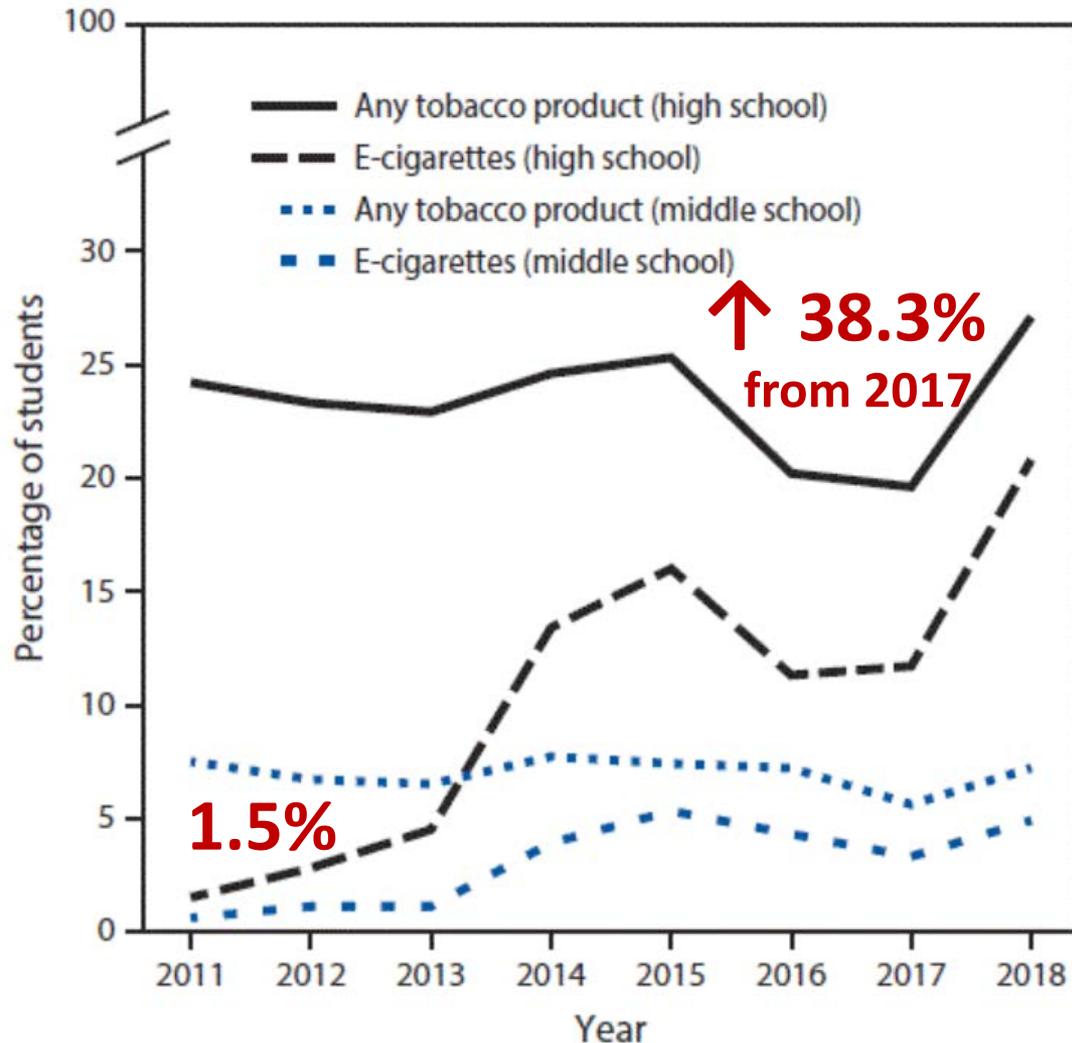
- Uses a JUUL he found at school, and has recently started smoking a “few cigarettes a week”
- Likes the “head rush” and social aspect of “JUULing”
- Uses high nicotine concentration pods/e-liquids and estimates his use to approximately 1-2 JUUL pods per week
- Says he would quit smoking, but is not interested in quitting vaping “it helps with my anxiety”

Jeremy

- What would you tell Jeremy about smoking/vaping?
- What other questions would you like to ask him?
- How could you help him quit smoking/vaping?



Percentage of U.S. middle/high school students who report using tobacco products in past 30 days



In 2018...

27.1% any tobacco prod.

20.1% e-cigarettes

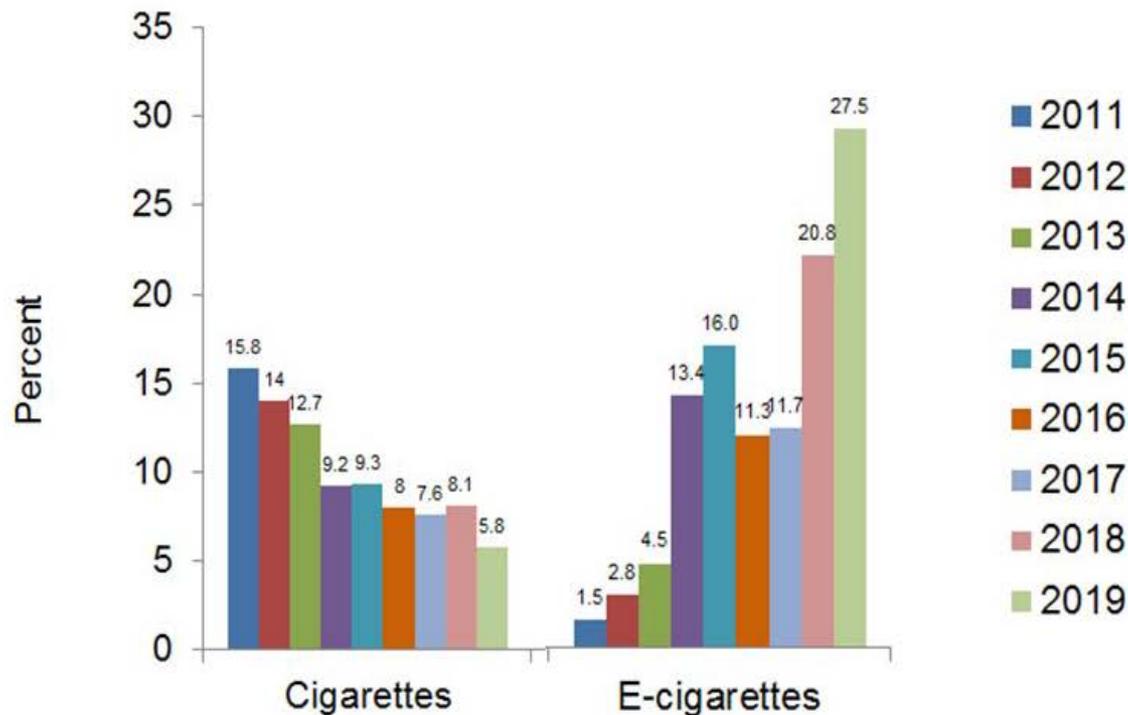
↑ 1,240% from 2011

7.2% of middle schoolers

Source: Cullen KA, et al. MMWR Morb Mortal Wkly Rep 2018;67:1276–1277.

Past 30-day use

NATIONAL YOUTH TOBACCO SURVEY*: YOUTH USE OF E-CIGARETTES CONTINUES TO CLIMB



* Preliminary data

* Reported use within 30 days preceding administration of survey.



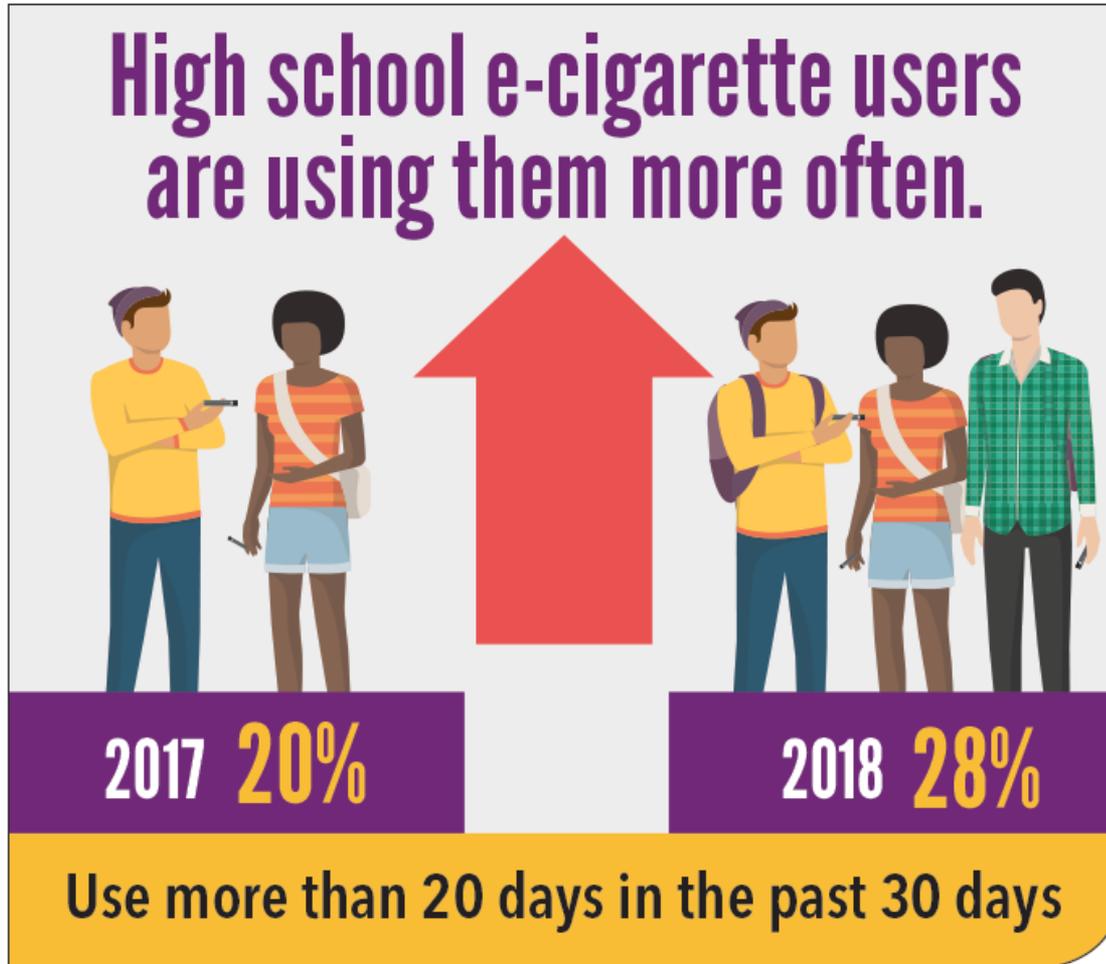
Monitoring the Future: nicotine vaping 2017-2019

Table 1. Prevalence of Nicotine Vaping among Adolescents, 2017–2019.*

Reporting Interval and Grade in School	Prevalence in 2017 (95% CI)	Prevalence in 2018 (95% CI)	Prevalence in 2019 (95% CI)	Change, 2018 to 2019 (95% CI)†
Past 30 days				
12th grade	11.0 (9.2–13.0)	20.9 (17.7–24.5)	25.4 (22.6–28.4)	4.5 (0.9–8.1)
10th grade	8.2 (6.6–10.2)	16.1 (14.0–18.6)	20.2 (17.8–22.8)	4.1 (0.9–7.2)
8th grade	3.5 (2.9–4.2)	6.1 (5.1–7.4)	9.0 (7.6–10.5)	2.8 (1.2–4.4)
Past 12 months				
12th grade	18.8 (16.5–21.4)	29.7 (26.1–33.6)	35.1 (31.8–38.6)	5.4 (1.1–9.6)
10th grade	15.8 (13.6–18.3)	24.7 (21.9–27.7)	31.1 (28.3–34.0)	6.4 (2.7–10.1)
8th grade	7.5 (6.6–8.5)	10.9 (9.4–12.6)	16.1 (14.1–18.2)	5.2 (2.8–7.6)
Ever				
12th grade	25.0 (22.4–27.7)	34.0 (30.3–38.0)	40.5 (37.3–43.8)	6.5 (2.3–10.7)
10th grade	21.4 (19.2–23.9)	28.6 (25.8–31.6)	36.4 (33.5–39.4)	7.7 (4.0–11.5)
8th grade	10.6 (9.5–11.8)	13.5 (11.8–15.3)	20.7 (18.5–23.1)	7.2 (4.6–9.9)
Daily‡				
12th grade	—	—	11.7 (9.8–14.0)	—
10th grade	—	—	6.9 (5.7–8.0)	—
8th grade	—	—	1.9 (1.4–2.5)	—

Source: Miech R et al. Trends in Adolescent Vaping, 2017–2019, NEJM, Sept 18, 2019

Increasing frequent* e-cigarette use



* Among e-cig users, percent using >20 days in past 30 days

E-cigarettes and...

Those who use only e-cigs are potentially a new group of youth who would not have smoked otherwise
(Dutra, 2017)

E-cigarettes are positively and independently associated with progression to current **established smoking** (Chaffee, 2018)

E-cigarette use associated with current and future marijuana use in youth
(Chadi, 2019)

E-cigarette use is strongly associated with use of **alcohol and other drugs**
(Curran, 2018)

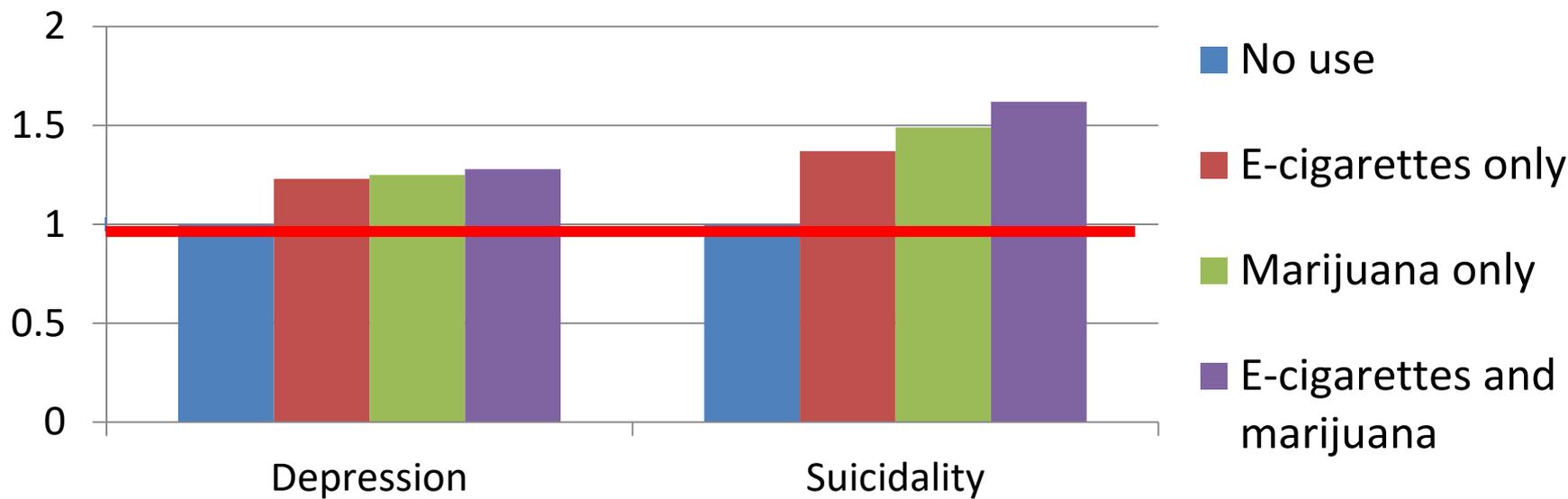
Depressive Symptoms and Suicidality in Adolescents Using e-Cigarettes and Marijuana

January 24, 2019

A Secondary Data Analysis From the Youth Risk Behavior Survey

Chadi, Nicholas, MD; Li, Guilin, MBBS; Cerda, Natalie, MD; Weitzman, Elissa R., ScD, MSc

Odds ratio of endorsing depressive and suicidal symptoms with past-year e-cigarette and/or marijuana use





FROM JUUL LABS



FROM JUUL LABS



JUUL



FROM JUUL LABS

VAPORIZED

The JUUL

- Pods contain e-liquid with highly absorbable nicotine salts
 - Heated into vapor and inhaled
- 1 JUUL pod = 0.7mL of nicotine (5% concentration)
 - Nicotine equivalent of **1 pack of cigarettes** (≈ 200 puffs)
- Youth-friendly flavors:
 - Mango
 - Mint
 - Crème
 - Cucumber
 - Fruit



JUULpods

\$15.99

Each pack contains 4 pods

JUUL pods (US)

VIRGINIA TOBACCO

5%, 3% Nicotine Strengths

★★★★★ (1560)



[QUICK SHOP](#)

[LEARN MORE](#)

MINT

5%, 3% Nicotine Strengths

★★★★★ (1940)



[QUICK SHOP](#)

[LEARN MORE](#)

CLASSIC TOBACCO

5%, 3% Nicotine Strengths

★★★★☆ (1054)



[QUICK SHOP](#)

[LEARN MORE](#)

MANGO

5%, 3% Nicotine Strengths

★★★★★ (7177)



[QUICK SHOP](#)

[LEARN MORE](#)

CREME

5%, 3% Nicotine Strengths

★★★★★ (2096)



CUCUMBER

5%, 3% Nicotine Strengths

★★★★☆ (2229)



FRUIT

5%, 3% Nicotine Strengths

★★★★☆ (2234)



MENTHOL

5%, 3% Nicotine Strengths

★★★★★ (1501)



JUUL pods (Canada)

JUULPODS

C\$20.99 /pack

Unavailable for online purchase in the province of Quebec

VIRGINIA TOBACCO

5%, 3%, 1.5% Nicotine Strengths



[QUICK SHOP](#)

[LEARN MORE](#)

MINT

5%, 3%, 1.5% Nicotine Strengths



[QUICK SHOP](#)

[LEARN MORE](#)

MANGO

5%, 3%, 1.5% Nicotine Strengths



[QUICK SHOP](#)

[LEARN MORE](#)

VANILLA

5%, 3%, 1.5% Nicotine Strengths



[QUICK SHOP](#)

[LEARN MORE](#)

FRUIT

5%, 3%, 1.5% Nicotine Strengths



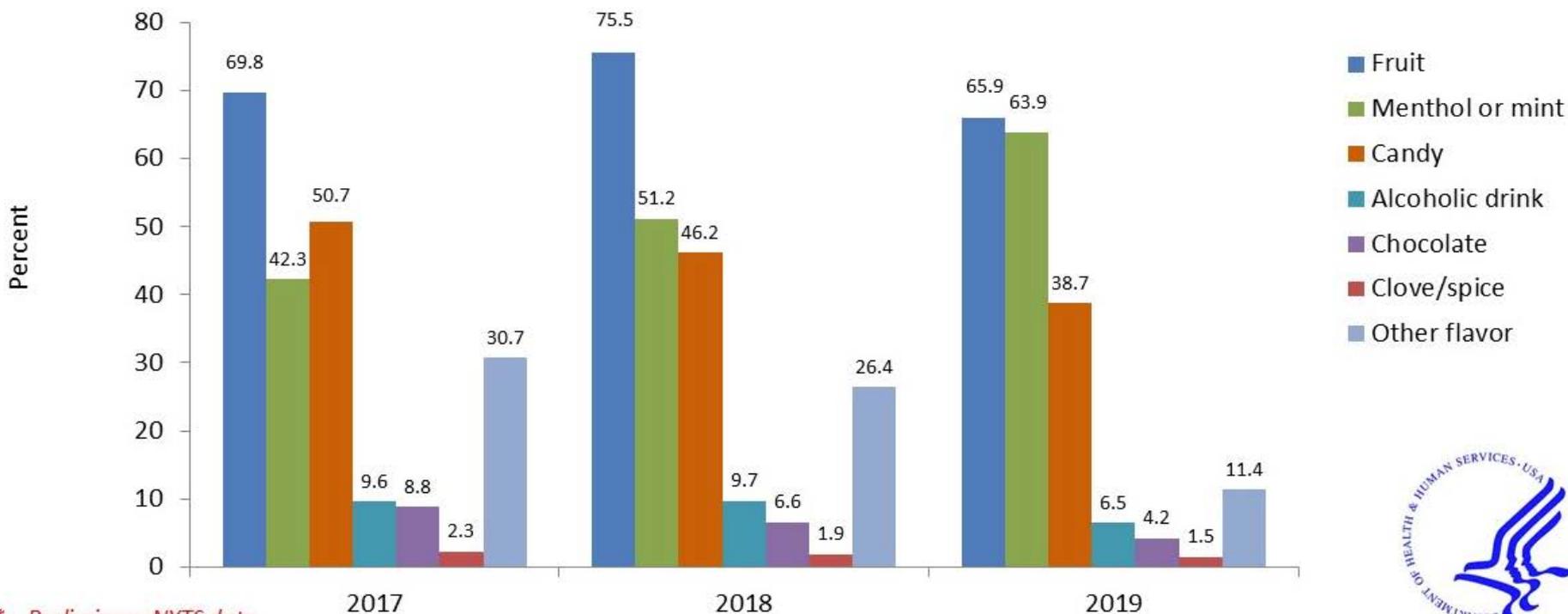
CUCUMBER

5%, 3%, 1.5% Nicotine Strengths



Which flavors are teens using?

FLAVORS POPULAR AMONG HIGH SCHOOL USERS OF E-CIGARETTES*



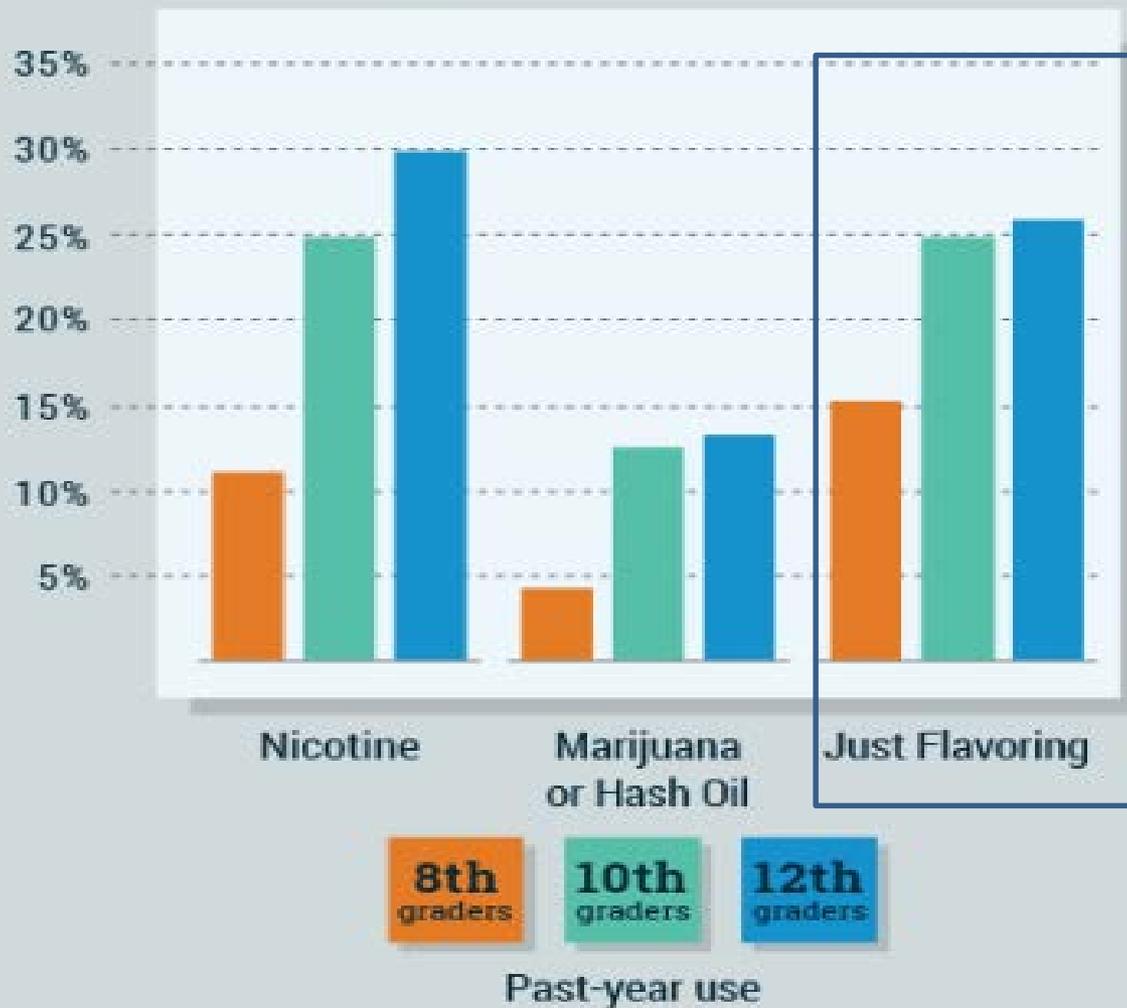
* Preliminary NYTS data



New and emerging products



WHAT DO TEENS SAY THEY ARE VAPING?

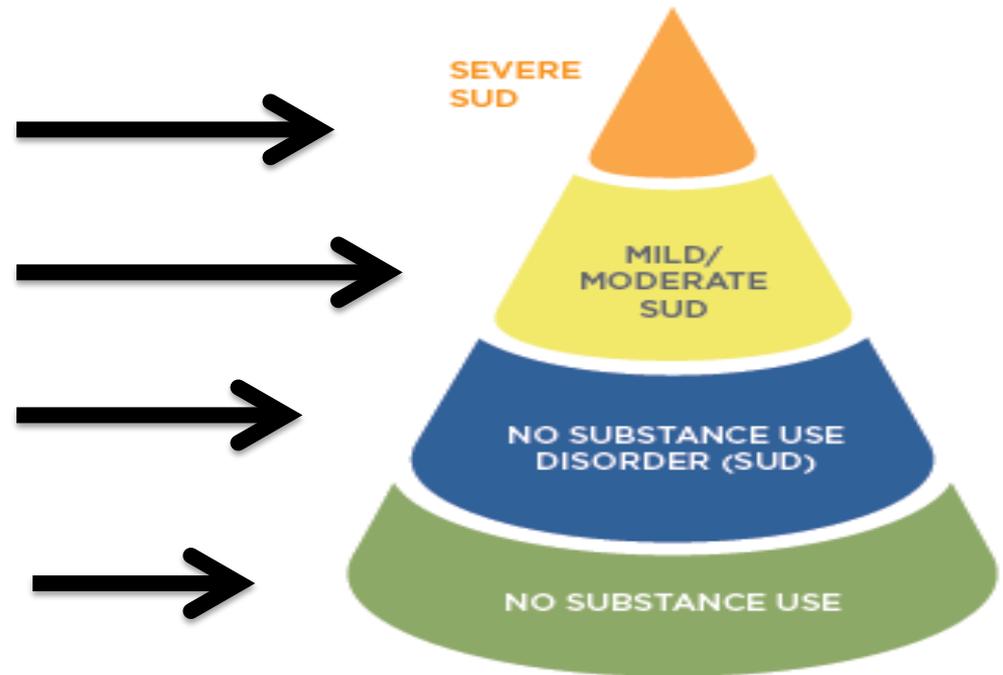


40% of teens using e-cigarettes unaware that they contain nicotine (Boykan, 2019)

Source:
Monitoring the
Future Survey, 2018

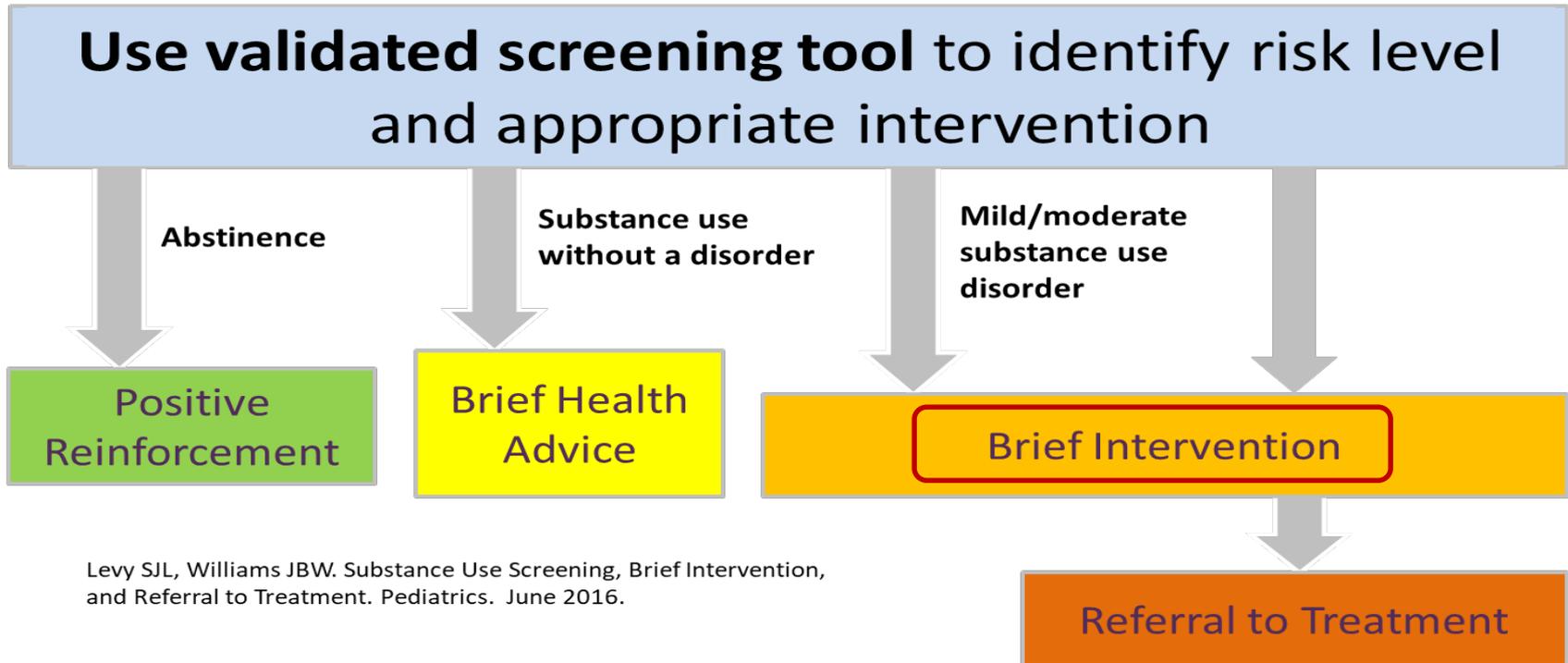
Screening to Brief Intervention (S2BI)

S2BI	
In the past year, how many times have you used:	
<ul style="list-style-type: none">• Tobacco, nicotine or e-cigarettes (i.e. JUUL)?	<ul style="list-style-type: none">• Weekly+
<ul style="list-style-type: none">• Alcohol?	<ul style="list-style-type: none">• Weekly/ Monthly
<ul style="list-style-type: none">• Marijuana?	<ul style="list-style-type: none">• Once or twice
	<ul style="list-style-type: none">• Never



Levy SJL, Williams JBW. Substance Use Screening, Brief Intervention, and Referral to Treatment. Pediatrics. June 2016.

Screening, Brief Intervention and Referral to Treatment (SBIRT)



SBIRT

SCREEN



BRIEF
INTERVENTION



REFERRAL TO
TREATMENT

The 5 As

Ask about use

Advise to quit

Assess readiness to quit

Assist in quit attempt

Arrange follow-up

U.S. Department of Health and Human Services. Treating tobacco use and dependence: 2008 update; Practice guideline executive summary: <http://www.ncbi.nlm.nih.gov/books/NBK63956>

Brief intervention



Use a patient-centered strengths-based approach



Advise adolescents to consider cessation



Provide information about health consequences



Use a non-judgmental approach



Determine readiness/willingness to quit (scale from 1 to 10)

Some terms you might hear...

- **Vaping/e-cigarette products:**

- Brands: JUUL/JUULing, Vuse, MarkTen, blu e-cigs, and Logic, etc.
- E-liquids, e-juice
- Dabs, dab pens, dab cards – (marijuana)

- **Techniques:**

- Drip, dripping or juicing – using e-liquids directly on heating coil
- Ghosting – hiding e-cigarette vapor in the mouth/airways
- JUUL challenges, stacking, “blinkers” – using one or many JUULs to reach very levels of vapor/nicotine in the lungs

- **Health effects/problems:**

- Getting “nicked” – Euphoria with high doses of nicotine
- Getting “nic sick” – Heart palpitations, nausea/vomiting, light-headedness with nicotine e-cigarette overuse

Jeremy and Zack

- Three weeks after being suspended for using a JUUL at school, Jeremy returns to your office, this time with his friend Jeremy
- Jeremy and Zack were “dripping” using a friend’s e-cigarette, when the device suddenly caught fire, burning Jeremy’s face



Zack

- Zack is in tears and tells you he doesn't want you to call his mother: "I'll be grounded forever!"
- He tells you that he is afraid his mother will confiscate his JUUL: "I get horrible headaches when I can't JUUL!"



Case discussion

- What are your next steps?
- What would you tell Zack's mother?
- How would you address Zack's headaches?



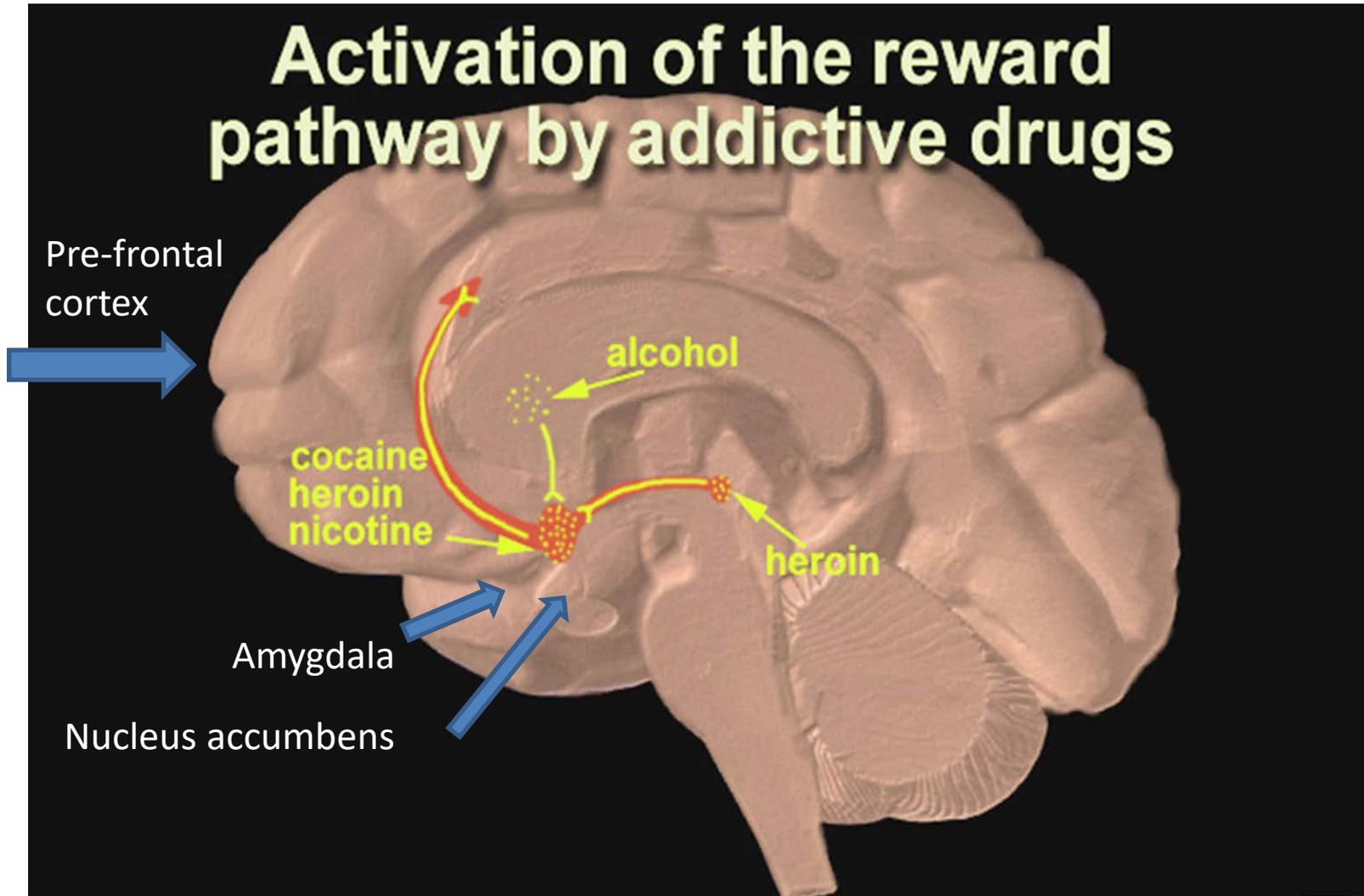
E-cigarettes: what are the risks?



- Brain risks
- Addiction
- Behavior risks:
 - Use of two or more tobacco products
 - Use of alcohol and other drugs
- Risks for the lungs and body
- Burn risks

<https://e-cigarettes.surgeongeneral.gov/>

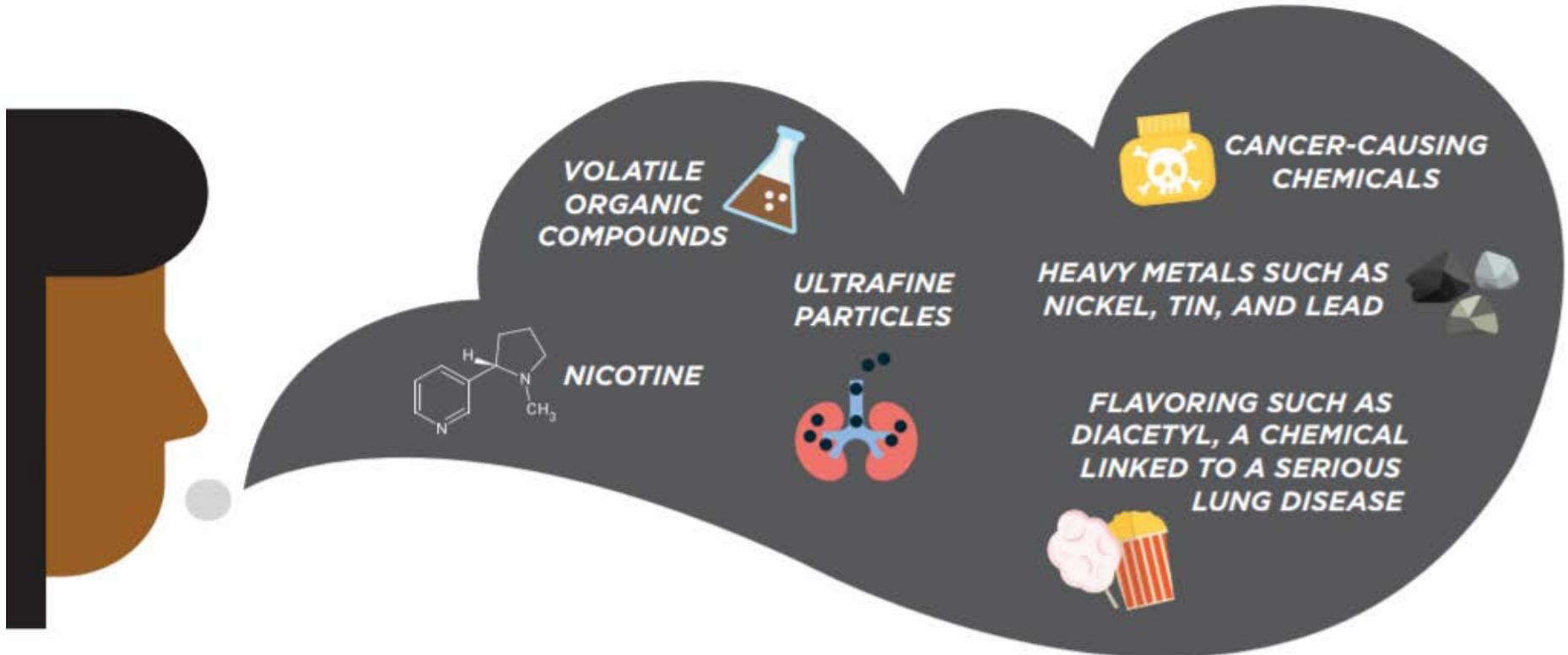
Substance use and the teen brain



Nicotine and the teen brain: long term effects

- Produces persistent **changes in the brain**
- **Long term** impacts:
 - Increased risk for drug addiction
 - including nicotine, marijuana, alcohol and cocaine
 - Impairments in attention capacity and working memory
 - Associated with mood disorders and poor impulse control

What is in an e-cigarette aerosol?



https://www.cdc.gov/tobacco/basic_information/e-cigarettes/Quick-Facts-on-the-Risks-of-E-cigarettes-for-Kids-Teens-and-Young-Adults.html

Dripping



- Thicker vapor
- Higher nicotine concentration (more addictive)
- Increased concentration and absorption of chemicals
- Burn risks with handling hot e-liquid

Acute Lung Injury



VIDEO

LIVE

SHOWS

2020 ELECTIONS



4th vaping-related death reported, CDC vows to find out 'what is making people sick'

By WILLIAM MANSELL Sep 6, 2019, 6:12 PM ET



Share



Tweet

The CDC also said the agency is aware of 450 possible vaping-related cases in 33 states, including 215 that have been previously reported. While vaping has been around for more than a decade, the CDC said the recent spike in illnesses started around May or June of this year.

Burn risk

- *Am Journal of Emergency Med* (Jake, 2017)
 - Alarming increases in rates of e-cigarette burns, often severe: risk of explosion
 - Most burns (72%) occur when device stored in **front pocket**
 - Multiple accounts of disfiguring facial burns
 - Manipulation of hot e-liquids during “dripping”

16-year-old, 2nd
degree burn



20-year-old, 2nd
degree thigh burn



POLICY STATEMENT Organizational Principles to Guide and Define the Child Health Care System and/or Improve the Health of all Children

American Academy
of Pediatrics



DEDICATED TO THE HEALTH OF ALL CHILDREN™

Clinical Practice Policy to Protect Children From Tobacco, Nicotine, and Tobacco Smoke

SECTION ON TOBACCO CONTROL

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

- **Screen** all patients for tobacco exposure
- Advise patients to **abstain** from all forms of tobacco
- Do **not recommend** e-cigarettes for smoking cessation/reduction
- Offer **counseling** for nicotine cessation as a first step
- Consider **pharmacotherapy** for adolescent daily smokers

Treatment strategies for e-cigarette use



- How to best assist

adolescents who want to qui

vaping is currently unknown

Clinicians across
the country report
using the
following
techniques

- **Patch**
 - 1+ pod/day: 21 mg
 - ½-1 pod per day: 14mg
 - A few “hits” a day: 7mg
- **Lozenges and gums**
 - As needed
- **Medications** used in adults
(Bupropion, Varenicline)
- Switching to **lower nicotine concentration** products
- **Biofeedback**
- **CBT and MI**

Alexis (Zack's older sister)

- Alexis, 17 years old, grade 12, in school dance troop
- Her mother calls you, she is very concerned
- She tells you that she has recently found an electronic cigarette and a device that Alexis called a “dab pen” in Alexis’ room
- She is concerned that Alexis’ vaping is affecting her grades at school



Alexis

- You meet with Alexis alone in clinic (you know her well) and share some of her mothers' concerns
- Alexis tells you that she used to be a “straight-A student”, but that this year has been “a lot harder...”



Alexis

- Alexis also tells you that she is having frequent arguments at home “over almost everything”
- She admits to breaking curfew and house rules
- She then blushes and says that she took some money from her mom’s purse to buy dab cards and JUUL pods, but “only a few times”



Case discussion

- What other information would you like to obtain from Alexis?
- What would be your next steps to help Alexis in this situation?
- What would you tell her mother if she called you again the next day?



Privacy and confidentiality

- Important to clarify the **limits** of confidentiality
- Should be discussed with **every adolescent** at the beginning of every visit
- Encourage the adolescent to be honest/truthful
- Create a space where the youth will feel comfortable sharing sensitive information
- Reasons to **breach confidentiality** (i.e. to parents):
 - Self-harm/suicidality, harm to others, sexual abuse

Vaping marijuana?



“Premium wax vaporizer”



“Liquid shatter” pen

Vaping marijuana?



20-30% of teen e-cigarette users have tried it
(Monitoring the Future Survey 2018)



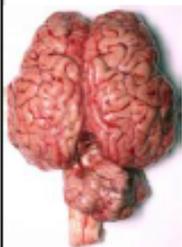
Teens often use **highly concentrated products** (THC/hash oils)



“Dab pens”:
Vaporizers specially designed to vape **cannabis concentrates**

Marijuana: Effects on the Body

It affects everyone in different ways.



Brain: impairs...

- short term memory
- learning
- judgment
- coordination
- reaction time
- sensory perception

Mood:

- panic/anxiety
- depression
- paranoia
- lack of motivation
- mood swings (aggressive, irritable)



Lungs:

- damages airways
- asthma attack
- infections
- emphysema, cancer

Sexual function: low sex drive

Female:

- irregular periods
- fertility problems



Pregnancy:

- less oxygen to baby
- premature birth effects
- THC via placenta, umbilical cord, breast milk



Male:

- low testosterone
- low sperm production
- erectile dysfunction
- increased breast growth



Heart: raises...

- blood pressure
- heart rate
- risk of heart attack



More:

- weight gain
- lowers immune system
- chronic fatigue

Source: www.mass.gov/dph/bsas

BNI-ART Institute, Boston University School of Public Health

Alexis

- Three months later, Alexis has successfully cut down on her marijuana and e-cigarette use
- She is using a 7mg nicotine patch and nicotine lozenges and hopes to stop using it in the next few weeks
- Her grades are **improving** and she is getting along better with her parents



Alexis

- However, she tells you that she is feeling **more anxious** about school and has trouble sleeping at night
- She asks you what you think of “medical marijuana”: “I know you told me to cut down on marijuana, but my friend uses her dap pen to help her sleep, and she says it really helps...”

Case discussion

- What other information would you like to obtain from Alexis?
- What would you tell Alexis about “medical marijuana”?
- What would be your next steps in this situation?



Teens and “medical” marijuana?

- Limited research on the safety and effectiveness of medical marijuana products in minors
- CBD: Molecule found in marijuana that does not have the same psychoactive effects as THC on the brain
 - Many proposed benefits, but evidence remains limited
 - **Caution:** Products labelled as CBD often contain THC
- In most cases, potential risks of medical marijuana **outweigh potential benefits**



Conclusion



Take home messages

E-cigarettes carry **acute and long-term risks** that should be discussed with adolescents

Screening for e-cigarette use with a validated screening tool followed by a brief intervention is **quick and effective**

Marijuana vaping has is now very common among youth and often involves use of high potency marijuana products

Treatment approaches that are applicable to cigarette and tobacco use **can be applied to e-cigarette use**; more research is needed in this area.

Questions?



Thank you!

