



# Vaping, E-Cigarettes, and Hookah: A 2020 Update

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# Presentation Objectives

1. Identify differences between various nicotine products and devices
2. Understand current product use trends
3. Synthesize current literature about short-term and long-term health consequences of use



# PART I

## Vaping and E-Cigarette Use



# The Basics of E-Cigarettes

- E-Cigarette, ENDS, Vape, Mod, JUUL...
- 3 basic components
  - Atomizer
  - Cartridge
  - Battery
- Noncombustible



# Vape Juice

- Prefilled or refillable cartridges
- Typically consists of:
  - Propylene Glycol
  - Vegetable Glycerin
  - Nicotine
  - Flavorings
  - Additives and Preservatives
  - Water



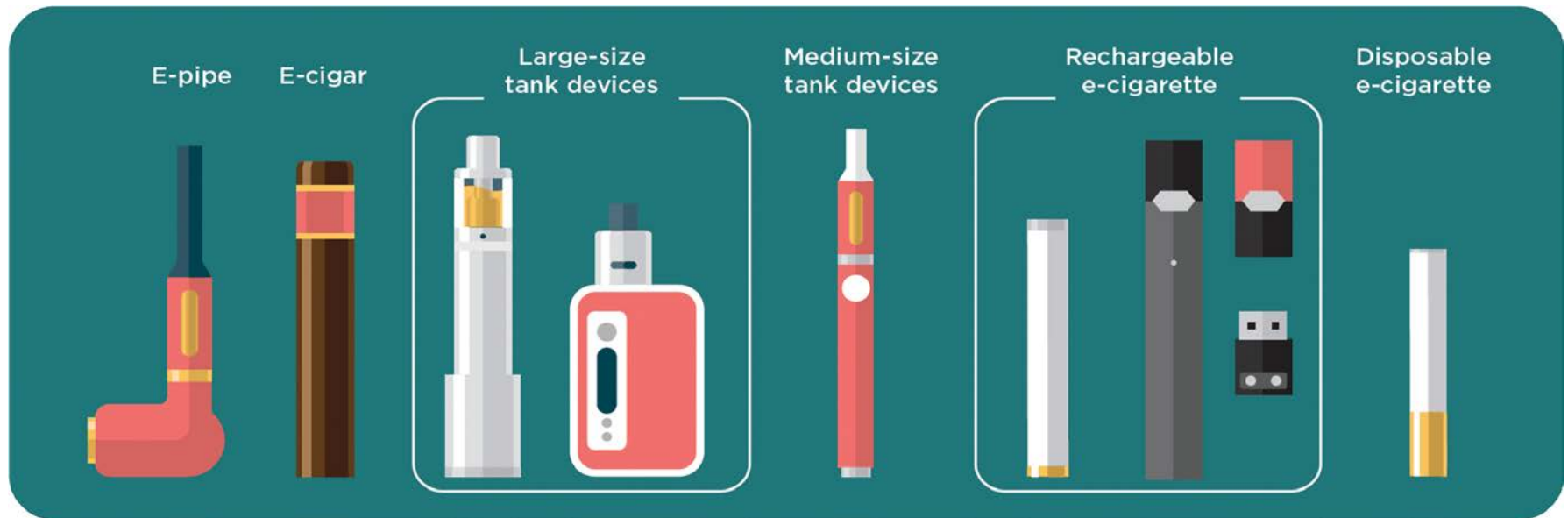
# UPDATE 1

## Products and User Profile



# The Current State of E-Cigarette Use

- Evolution of Products





# The Current State of E-Cigarette Use

- Evolution of Products





# The Current State of E-Cigarette Use

- JUUL

- Currently the most popular e-cigarette on the market, with more than 70% of the e-cigarette market share in the U.S.



# The Current State of E-Cigarette Use

- CDC found 3.2% of adults reported vaping every day or some days in 2018
  - Overall tobacco use approximately 20%
- July 2019 Gallup poll found 8% of adults vaped in the last week
- Vaping much less common among those 30 and older

AGE	CIGARETTES	E-CIGARETTES
18-29 Years	16%	20%
30-49 Years	23%	9%
50-64 Years	26%	7%
65+ Years	10%	N/A

CDC MMWR. Tobacco Product Use and Cessation Indicators Among Adults — United States, 2018. November 15, 2019 / Vol. 68 / 45  
<https://news.gallup.com/poll/267413/percentage-americans-vape.aspx>  
<https://news.gallup.com/poll/237818/young-people-adopt-vaping-smoking-rate-plummets.aspx>



# The Current State of E-Cigarette Use

**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)	—

<https://www.nejm.org/doi/full/10.1056/NEJMc1910739>

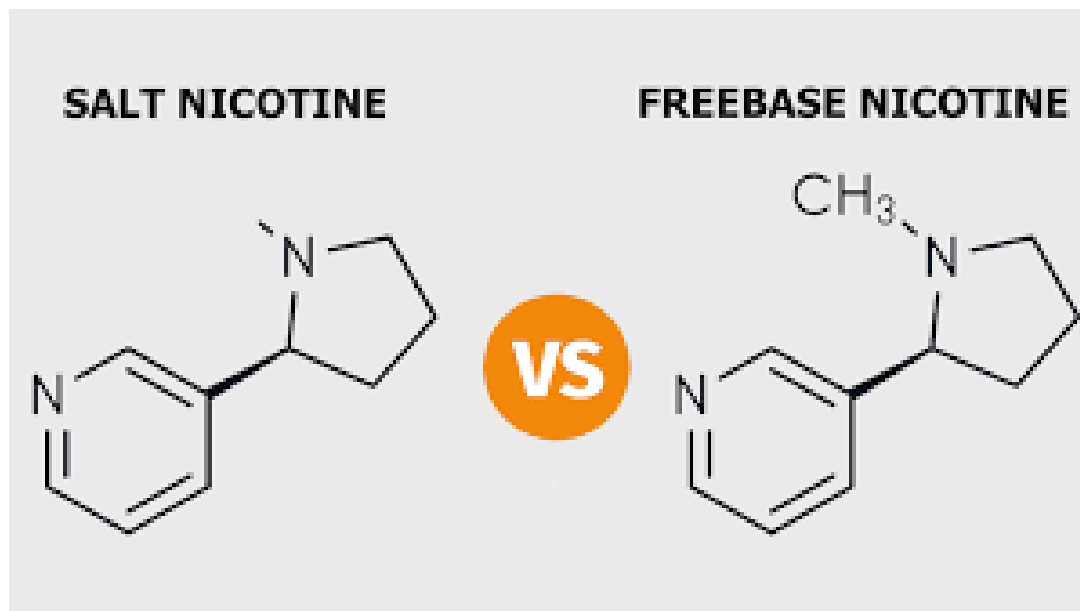


# UPDATE 2

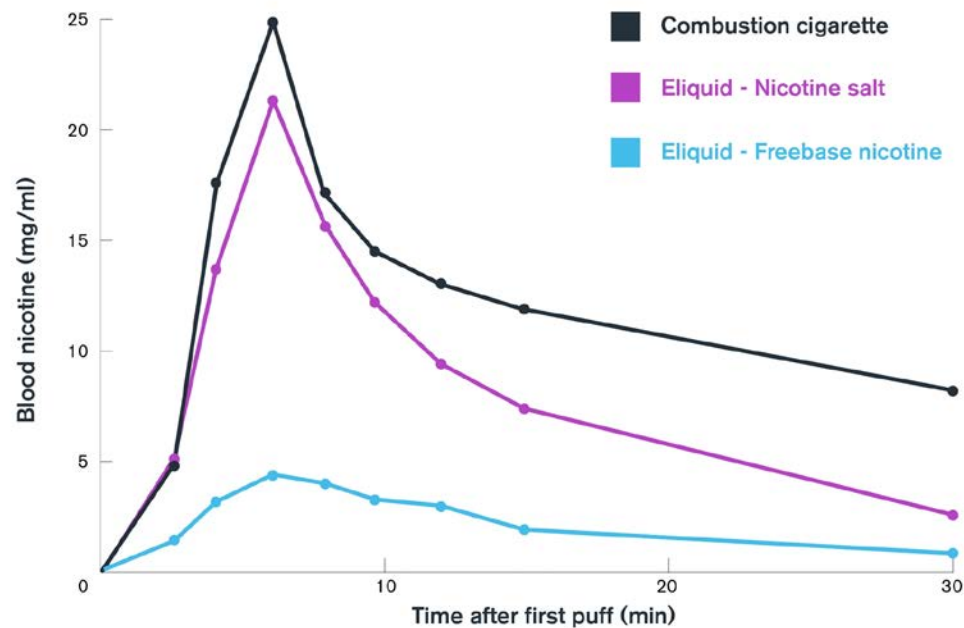
## Nicotine



# Nicotine Salts vs. Freebase Nicotine



# Nicotine Salts vs. Freebase Nicotine





# JUUL Nicotine Concentrations

- One JUULpod contains a nicotine concentration equivalent to one pack of cigarettes, or 200 puffs.
  - Each 5% JUULpod is manufactured to contain about 40mg of nicotine
  - Each 3% JUULpod is manufactured to contain about 23mg of nicotine

<https://support.juul.com/hc/en-us/articles/360026223453-How-much-nicotine-is-in-a-JUULpod->



# UPDATE 3

## EVALI

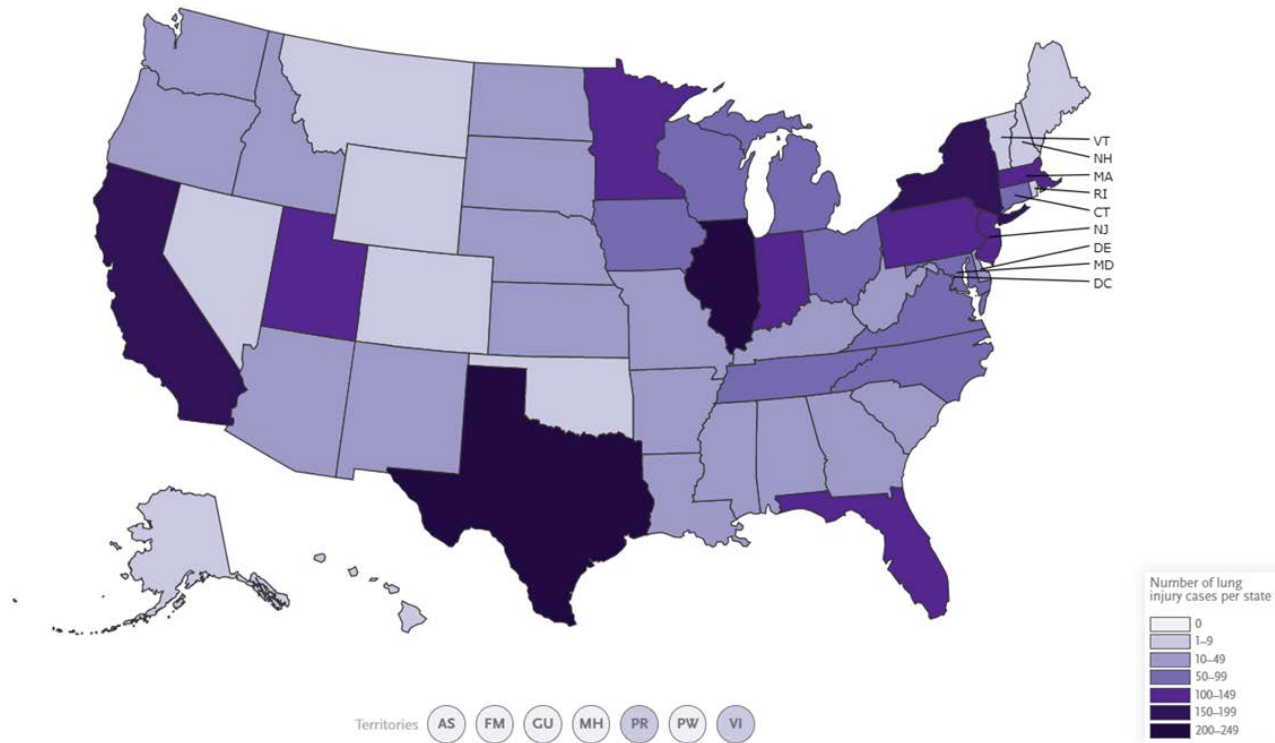


# E-Cigarette and Vaping-Related Acute Lung Injury (EVALI)

- In June 2019, e-cigarette, or vaping, product use-associated lung injury (EVALI) was identified. Cases peaked in September 2020
- As of February 18, 2020, there were:
  - 2807 cases
  - 68 deaths



# E-Cigarette and Vaping-Related Acute Lung Injury (EVALI)



[https://interactives.nejm.org/ile/cdc\\_vaping/index.html](https://interactives.nejm.org/ile/cdc_vaping/index.html)

# E-Cigarette and Vaping-Related Acute Lung Injury (EVALI)

As of February 18, 2020:

- 66% were male
- The median age of deceased patients was 49.5 years and ranged from 15-75 years
  - 15% of patients were under 18 years old;
  - 37% of patients were 18 to 24 years old;
  - 24% of patients were 25 to 34 years old; and
  - 24% of patients were 35 years or older.

[https://www.cdc.gov/tobacco/basic\\_information/e-cigarettes/severe-lung-disease.html#latest-information](https://www.cdc.gov/tobacco/basic_information/e-cigarettes/severe-lung-disease.html#latest-information)  
<https://www.nejm.org/doi/full/10.1056/NEJMoa1911614>



# E-Cigarette and Vaping-Related Acute Lung Injury (EVALI)

- 82% reported using THC-containing products (33% reported exclusively)
- 57% reported using nicotine-containing products (14% reported exclusive use of nicotine-containing products)
- Vitamin E acetate common diluent, but not present in all cases
- Point of sale variation

[https://www.cdc.gov/tobacco/basic\\_information/e-cigarettes/severe-lung-disease.html#latest-information](https://www.cdc.gov/tobacco/basic_information/e-cigarettes/severe-lung-disease.html#latest-information)

<https://www.nejm.org/doi/full/10.1056/NEJMoa1911614>

<https://www.fda.gov/news-events/public-health-focus/lung-injuries-associated-use-vaping-products>





# E-Cigarette and Vaping-Related Acute Lung Injury (EVALI)

## Clinical Presentation

- SOB, fever, cough, vomiting and diarrhea common
- Headache, dizziness and chest pain may also present



<https://www.health.state.mn.us/diseases/lunginjuries/index.html>  
<https://www.nejm.org/doi/full/10.1056/NEJMoa1911614>



# E-Cigarette and Vaping-Related Acute Lung Injury (EVALI)

- **EVALI is a diagnosis of exclusion**

- **Confirmed Case**

- Vape use in 90 days prior to symptom onset
    - Pulmonary infiltrates on CXR or ground glass opacities on CT
    - Absence of pulmonary infection on initial work-up

[https://www.cdc.gov/tobacco/basic\\_information/e-cigarettes/assets/2019-Lung-Injury-Surveillance-Case-Definition-508.pdf](https://www.cdc.gov/tobacco/basic_information/e-cigarettes/assets/2019-Lung-Injury-Surveillance-Case-Definition-508.pdf)



# E-Cigarette and Vaping-Related Acute Lung Injury (EVALI)

- EVALI is a diagnosis of exclusion

- Probable Case

- Vape use in 90 days prior to symptom onset
    - Pulmonary infiltrates on CXR or ground glass opacities on CT
    - Infection identified via culture or PCR, but clinical team believes this infection is not the sole cause of the underlying lung injury **OR** minimum criteria to rule out pulmonary infection not met (testing not performed) and clinical team believes infection is not the sole cause of the underlying lung injury
    - No evidence in medical record of alternative plausible diagnoses

# E-Cigarette and Vaping-Related Acute Lung Injury (EVALI)

- **Clinical Guidance**

- Patient interview
- Physical exam
- Lab tests and imaging
- R/O influenza and other respiratory diseases
- Corticosteroids
- Discontinuing product use\*\*\*



# UPDATE 4

## Regulations



# FDA Regulations Have Evolved

- In August of 2016, FDA used deeming rule to regulate e-cigarettes
  - Ban sales to minors and developed Youth Tobacco Prevention Plan (Access, Marketing, Education)
  - Retailer and manufacturing checks

<https://www.fda.gov/news-events/fda-voices/how-fda-regulating-e-cigarettes>





# FDA Regulations Have Evolved

- Updated flavored e-cigarette policy went into effect in February 2020
  - Menthol and tobacco flavors remain available
  - All flavors may continue to be sold in devices that cannot be refilled and are designed to be disposed of after the flavored nicotine has run dry and in open systems

<https://www.fda.gov/news-events/press-announcements/fda-finalizes-enforcement-policy-unauthorized-flavored-cartridge-based-e-cigarettes-appeal-children>



# FDA Regulations Have Evolved

## NOT ALLOWED:



## ALLOWED:



<https://truthinitiative.org/research-resources/emerging-tobacco-products/what-vape-products-are-still-allowed-under-new-e>



# Screening For Vape Use

- Vape detectors
- Geofencing



# UPDATE 5

## Research



# What Does the Literature Say?

- JUUL and Combusted Cigarettes Comparably Impair Endothelial Function
  - Tobacco Regulatory Science, January 2020 by Rao, Liu, and Springer
    - JUUL group had highest nicotine serum. Other e-cig and cigarette group nicotine levels were lower and comparable to each other
    - Aerosol exposure impaired endothelial function comparably

# What Does the Literature Say?

- **E-Cigarettes Significantly Raise Risk of Chronic Lung Disease**
  - American Journal of Preventative Medicine, December 2019 by Bhatta and Glantz
    - First long-term study
    - E-cigarette use is an independent risk factor for development of lung disease
    - Dual use is riskier than using either product alone

[https://www.ajpmonline.org/article/S0749-3797\(19\)30391-5/fulltext](https://www.ajpmonline.org/article/S0749-3797(19)30391-5/fulltext)





# What Does the Literature Say?

- Is there a correlation between vaping and contracting COVID-19?



# UPDATE 6

## New Products



# The New JUUL... Puff Bars

- Disposable
- “Better taste”
- 7% Nicotine
- Not subject to flavor bans because of legislation loophole



[https://puffbar.com/collections/buy-puff-bar-direct?gclid=CjwKCAjw4871BRAjEiwAbxXI212HhkGFyFPgoVSKDH5e1iL4\\_\\_fX6vzpMhAVyhEKH2RDS\\_4jNGxVBoc9OMQAvD\\_BwE#](https://puffbar.com/collections/buy-puff-bar-direct?gclid=CjwKCAjw4871BRAjEiwAbxXI212HhkGFyFPgoVSKDH5e1iL4__fX6vzpMhAVyhEKH2RDS_4jNGxVBoc9OMQAvD_BwE#)

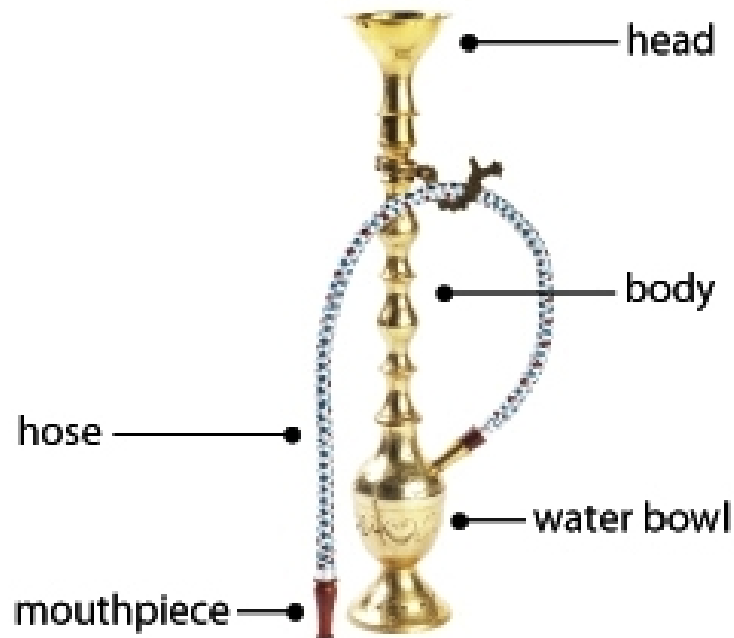


# PART II

## Hookah



# The Basics of Hookah



# Hookah Trend Data

- Among 12th graders, annual hookah use increased from nearly 1 in 6 students in 2010, to 1 in 4 students in 2014, but since that time has decreased sharply to nearly 1 in 13 (8%) students in 2018
- About 1 in every 8 (12%) young adults aged 19-30 years had used a hookah to smoke tobacco during the previous year.



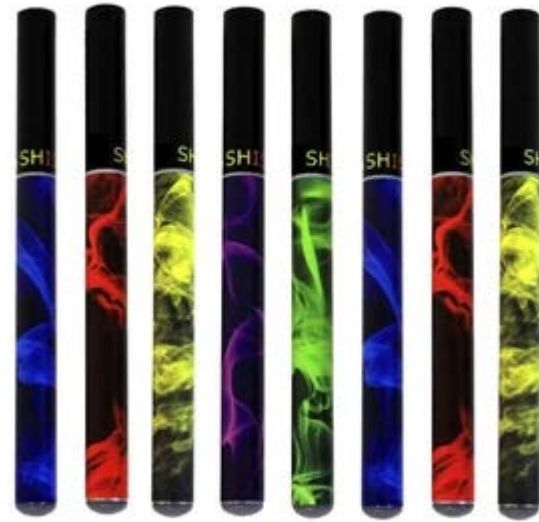
# Hookah Trends

- **Steam stones**
  - Pebble-like porous rocks, which are marinated in flavorings similar to those that give hookah tobacco its sweet and fruity taste
  - Heated in the heads of hookah devices in place of tobacco to create a smoke-like vapor, which is inhaled



# Hookah Trends

- Hookah pens
  - Similar to an e-cigarette, and contain nicotine, flavorings, and other chemicals into an aerosol, which is inhaled





# Questions?

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