

*The Mysterious Vaping Illness  
That's 'Becoming an Epidemic'*

*NY Times, August 31, 2019*

# Vaping and Acute Respiratory Illness

## A Clinical Update

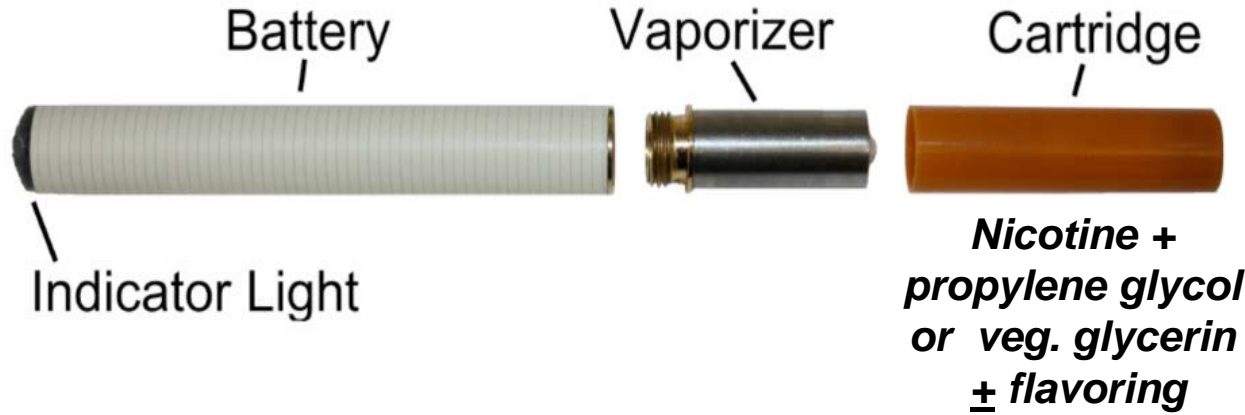
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Division of General Internal Medicine and Mongan Institute

Disclosures: UpToDate (royalties), Achieve Life Sciences (consultant), Pfizer (travel expenses)

# Electronic Cigarettes

*A nicotine delivery device that sometimes looks like a cigarette*



**No tobacco burned → Safer than cigarettes?**

**Not FDA approved → Many knowledge gaps**

**The devices are changing rapidly**

# Public Health Impact of Electronic Cigarettes

## Depends on 3 factors

### Potential benefit

- Help more smokers to quit smoking (especially those unable to quit with FDA-approved medications)

### Potential risks

- Nonsmokers vape → nicotine dependence → transition to cigarettes
- Possible health risks of vaping
  - Absolute (vs. nonsmoking) – youth / nonsmokers
  - Relative to combustible tobacco – adult smokers

# E-Cigarettes - Summary of the Evidence

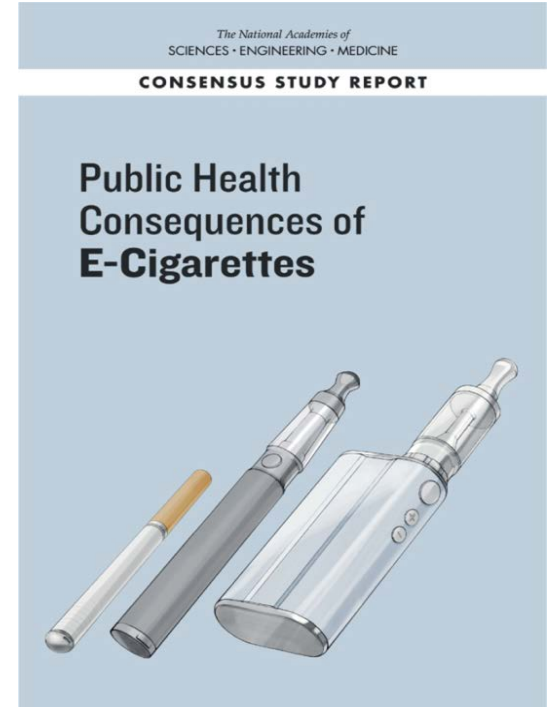
*2018 National Academy of Science, Engineering and Medicine Report*

## Exposure:

- E-cigarettes contain fewer (and lower levels) of toxic substances than conventional cigarettes

## Health Effects:

- **While not without health risks, they are likely to be far less harmful than combustible tobacco cigarettes**
- Long-term health effects of e-cigarettes are not yet clear



# Electronic Cigarettes *What should you say to a smoker?*

- Many unanswered questions about safety and efficacy
- They are likely less harmful than smoking combustible cigarettes
- Recommend FDA-approved safe, effective treatments first
- If these treatments are not effective or desired, then what?
  - If using e-cigarettes, switch completely and stop smoking
  - Urge patients using e-cigarettes to plan to quit e-cigs too because health effects of long-term use are not known.

*Consistent with American College of Cardiology and American Cancer Society guidelines*

# JUUL Phenomenon

- Sleek high-tech design
- Better nicotine delivery
- Social media marketing



MAY 14, 2018 ISSUE

## THE PROMISE OF VAPING AND THE RISE OF JUUL

Teens have taken a technology that was supposed to help grownups stop smoking and invented a new kind of bad habit, molded in their own image.



Public Safety

### Juuling: If you don't know what it is, ask your kids

*'I Can't Stop': Schools Struggle With Vaping Explosion*

*Did Juul Lure Teenagers and Get 'Customers for Life'?*



# Monitoring the Future Study

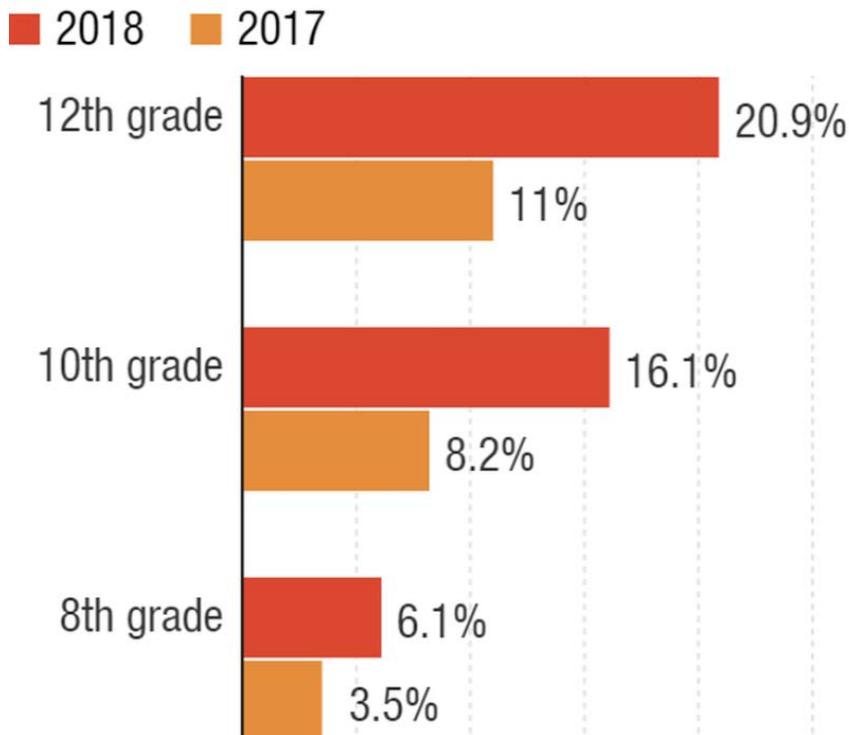
*NEJM Dec. 2018*

Annual cross-sectional school  
survey of US adolescents in  
grades 8-12

## CAVEAT:

Prevalence of smoking did not  
change and is at a historic low

## Prevalence Of Nicotine Vaping Past 30 days

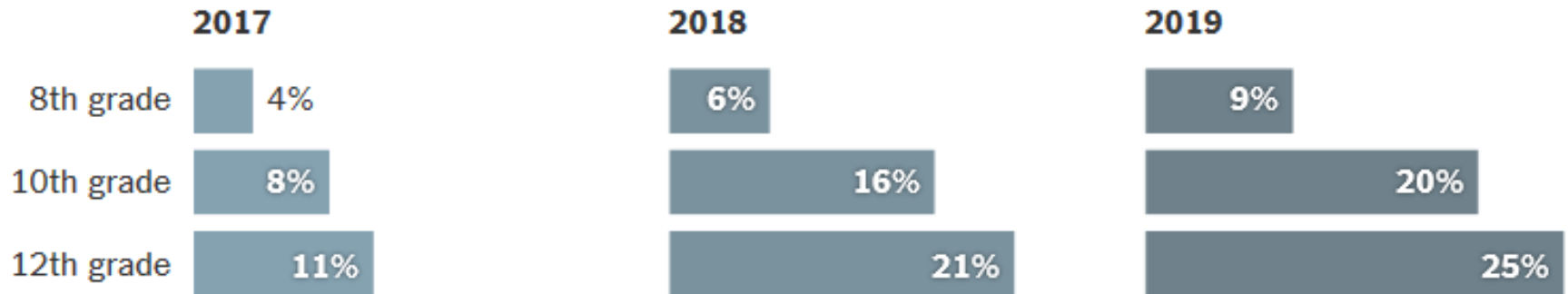




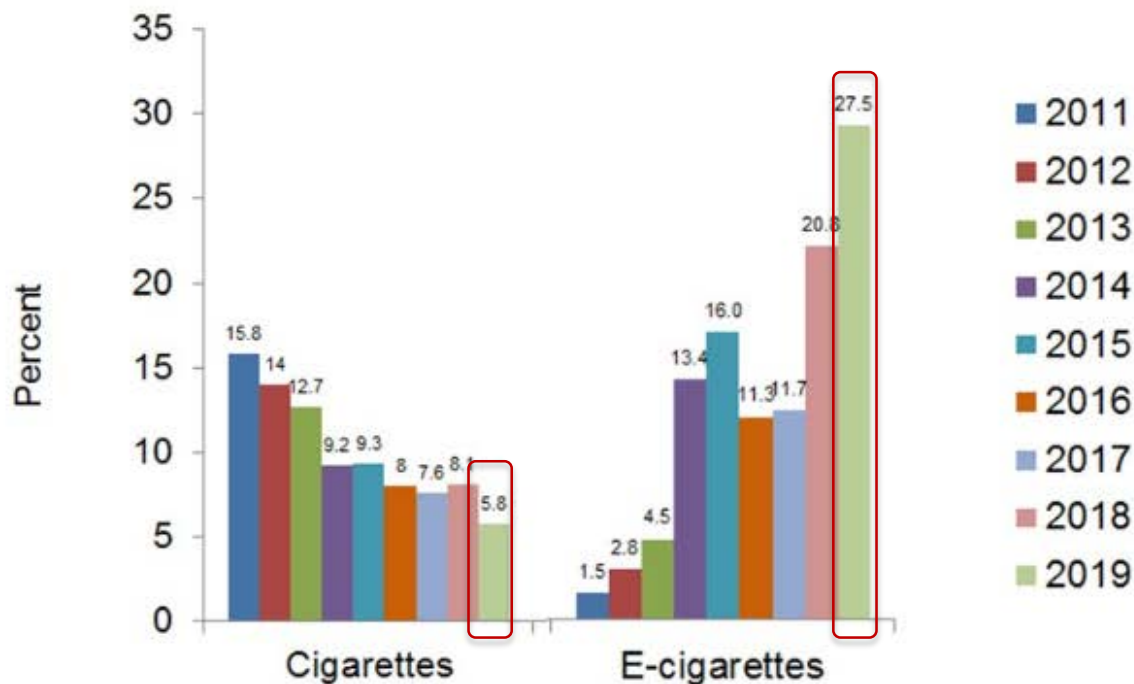
# *Teenage Vaping Rises Sharply Again This Year*

## **2019 Monitoring the Future Survey**

E-cigarette use in the past 30 days



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



\* Preliminary data

\* Reported use within  
30 days preceding  
administration of survey.

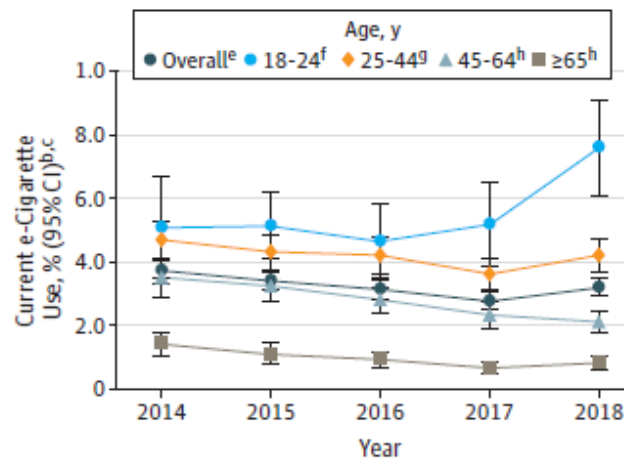


# Adult E-cigarette Use

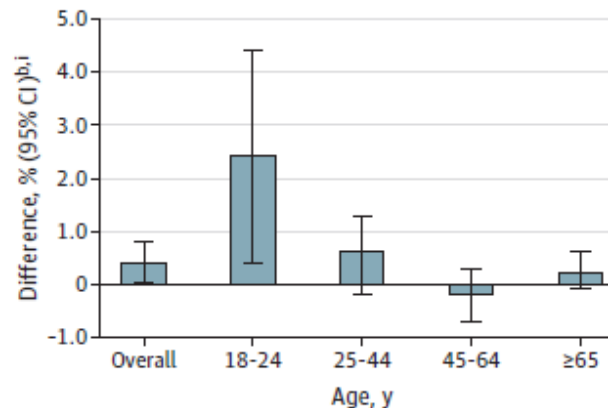
National Health  
Interview Surveys,  
2014-2018

*Dai, JAMA 2019*

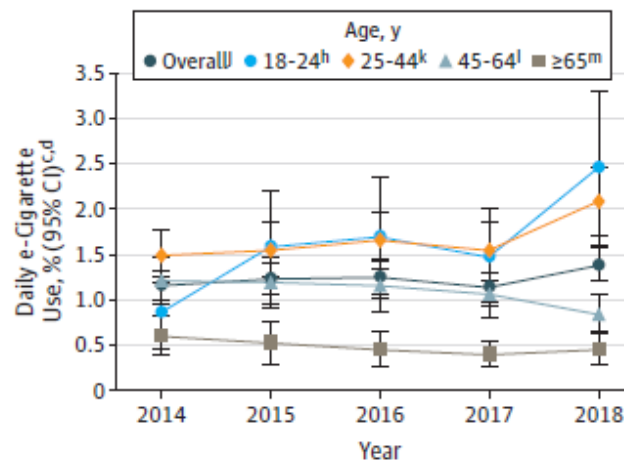
**A** Prevalence of current use by age, 2014-2018



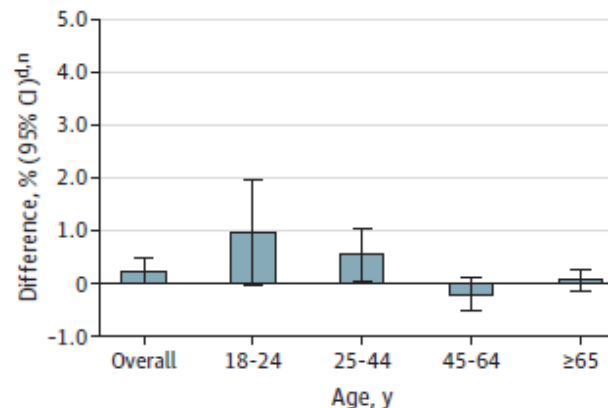
**B** Differences in current use prevalence by age, 2018 vs 2017



**C** Prevalence of daily use by age, 2014-2018



**D** Differences in daily use prevalence by age, 2018 vs 2017



# Critical questions

- What will be the natural history of this cohort of young never smoking JUUL users?
  - How many will switch to combustible cigarettes?
    - Why would they switch to a “less desirable” product?
  - If few become smokers, how long will e-cig/JUUL use last?
    - How many will become nicotine dependent?
    - How many will need help to quit e-cigarettes?
    - How harmful is long-term JUUL use in young nonsmokers?

**Mystery lung illness linked to vaping. Health officials investigating nearly 100 possible cases.**

**What's Behind A Cluster Of Vaping-Related Hospitalizations?**

Aug. 16, 2019

***Vaping Sickesses Rising: 153 Cases Reported in 16 States***

Aug. 21, 2019

***First Death in a Spate of Vaping Sickesses Reported by Health Officials***

***Another Patient Has Died From Lung Disease After Vaping***

Sept. 5, 2019

This is an official



HEALTH ADVISORY

# CDC Health Advisory

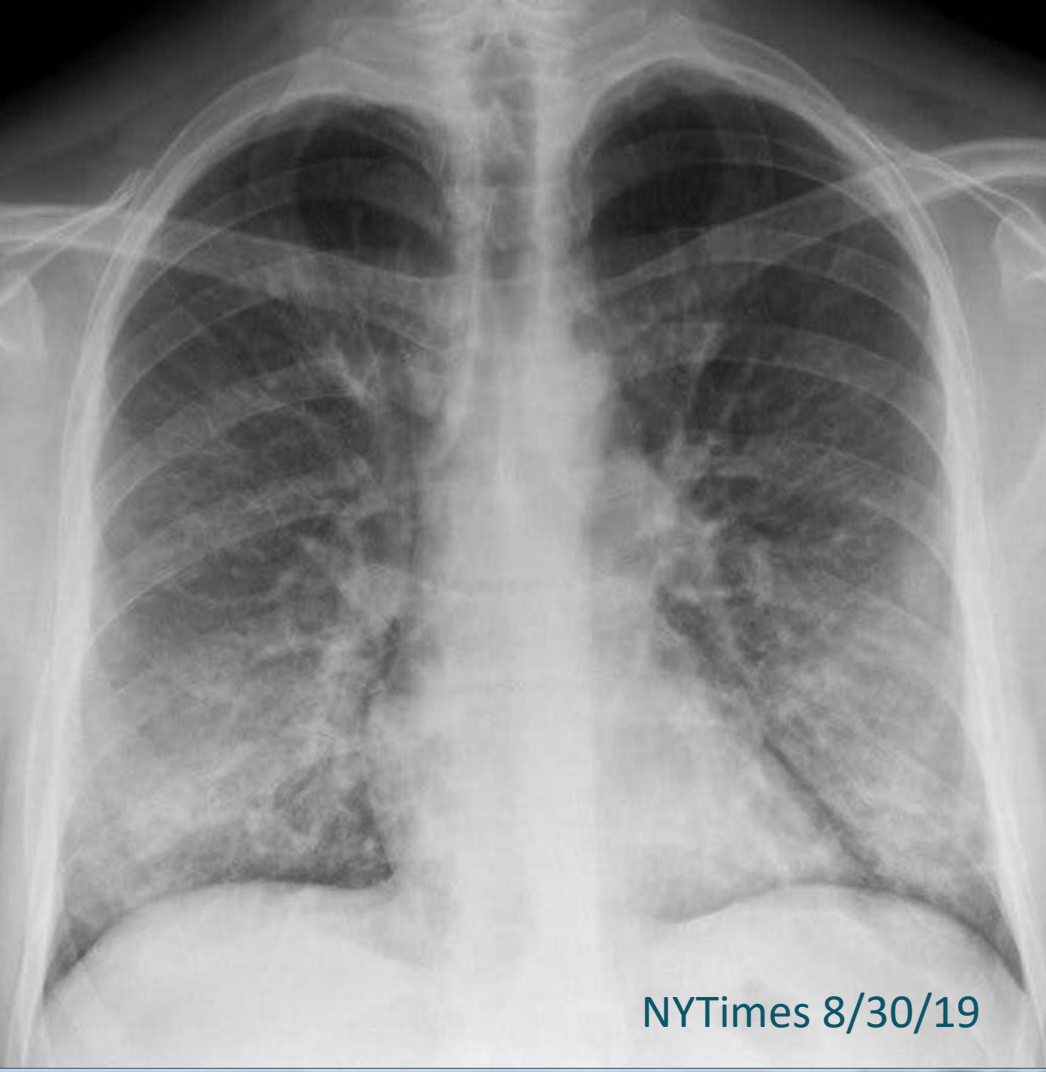
8/30/19

- 215 cases reported from 25 states, 1 death
- Most in adolescents and young adults
- Symptoms
  - Respiratory: cough, dyspnea, chest pain
  - GI: nausea, vomiting, diarrhea
  - Non-specific: fever, fatigue, weight loss
- Onset: acute (several days) to subacute (weeks)
- Exam: fever, tachycardia
- Lab: ↑WBC; No infectious etiology identified after work-up

# Exposures

- All used e-cigarette products (different devices) a few days to weeks before symptoms started
- Many reported using e-cigarettes containing cannabinoids (THC, CBD)
- Some used e-liquids not purchased from stores
- No single substance or product is associated with the illness
- In a few cases, oil staining in alveolar macrophages (BAL)





NYTimes 8/30/19

- **CXR:** bilateral infiltrates

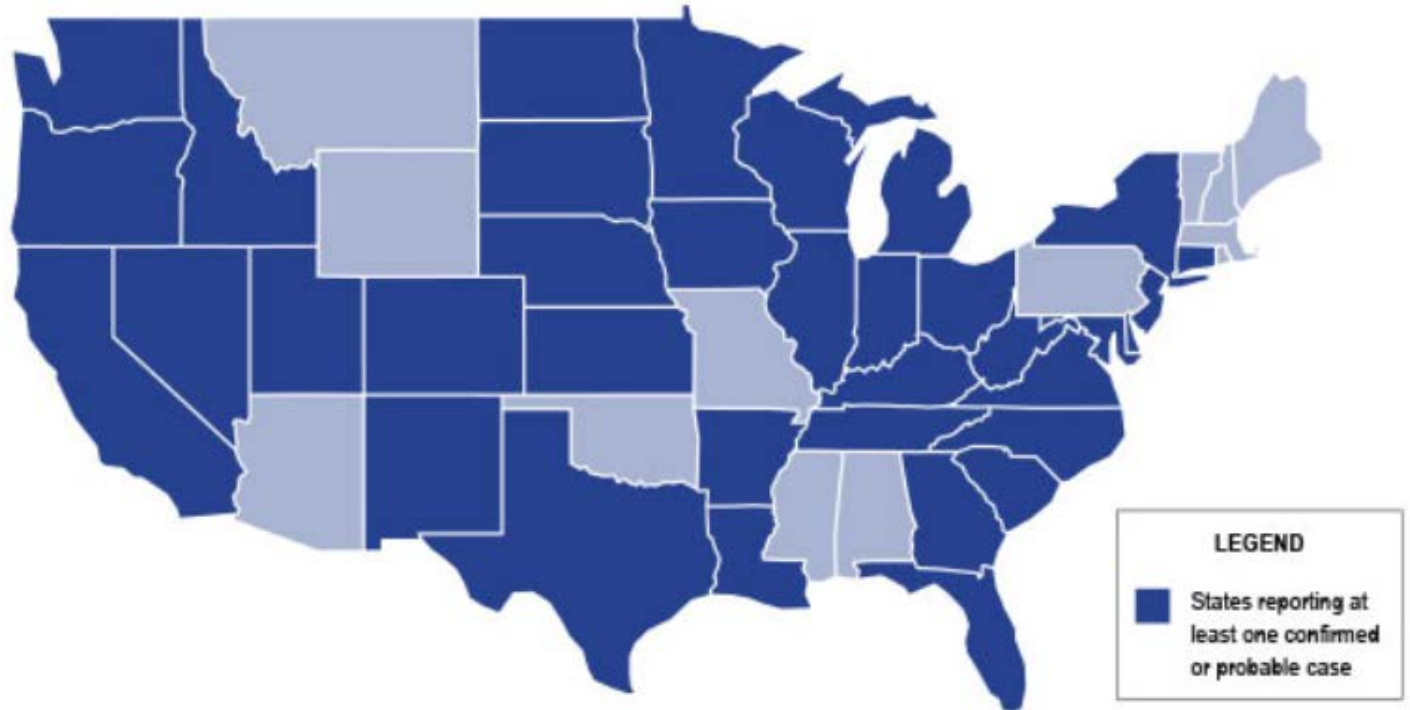
## **Clinical course**

- Many required supplemental O<sub>2</sub>
- Some needed mechanical ventilation
- Antimicrobials do not appear to be helpful
- Possible response to corticosteroids

*CDC Advisory – 8/30/19*

Sept. 6, 2019

# *Cases of Vaping-Related Lung Illness Surge, Health Officials Say*



Sept. 11, 2019

380 cases

36 states + US VI

6 deaths

Morbidity and Mortality Weekly Report

9/13/19

## Outbreak of Electronic-Cigarette–Associated Acute Lipoid Pneumonia — North Carolina, July–August 2019

Kevin Davidson, MD<sup>1</sup>; Alison Brancato, MS<sup>1</sup>; Peter Heetderks, MD<sup>1</sup>; Wissam Mansour, MD<sup>1</sup>; Edward Matheis, MD<sup>1</sup>; Myra Nario, MS<sup>1</sup>; Shrinivas Rajagopalan, MD, PhD<sup>2</sup>; Bailey Underhill, MS<sup>1</sup>; Jeremy Wininger, MS<sup>1</sup>; Daniel Fox, MD<sup>1</sup>

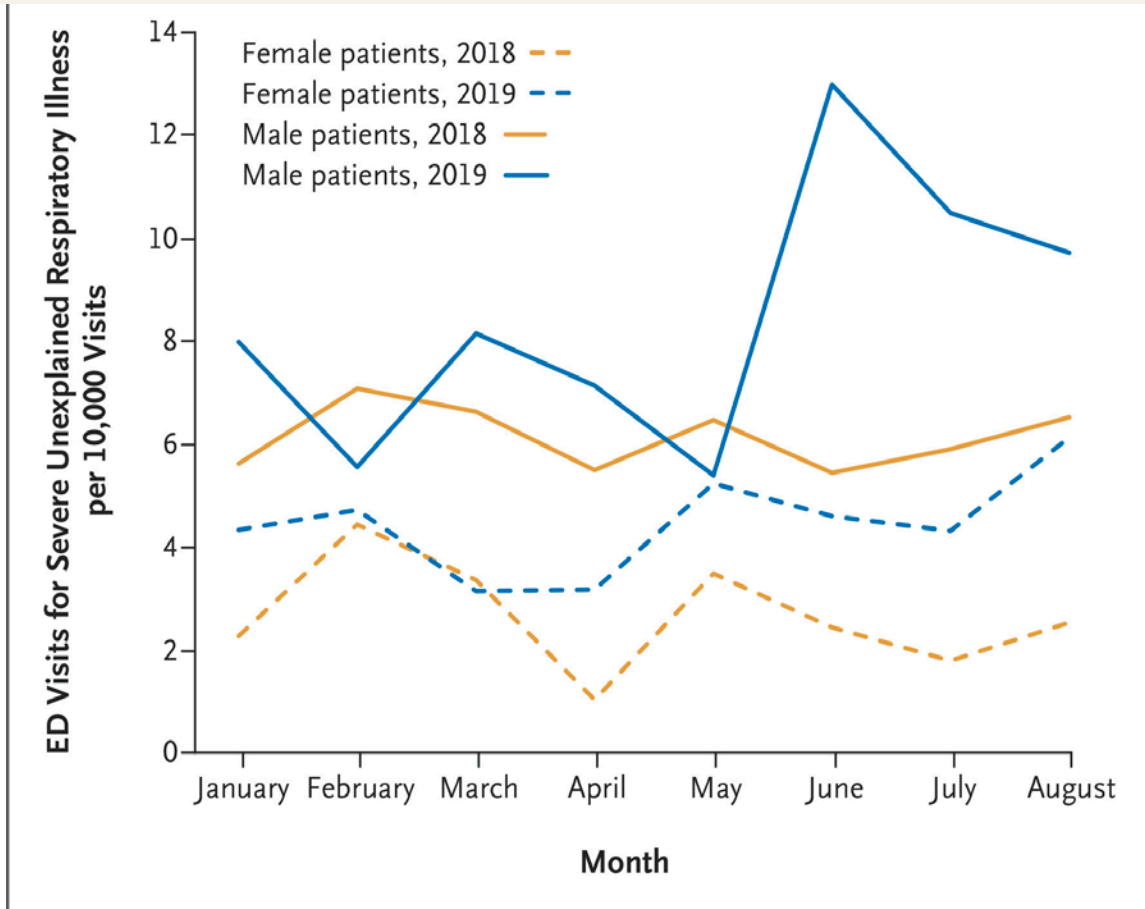
*The* NEW ENGLAND JOURNAL *of* MEDICINE

9/11/19

## Pulmonary Illness Related to E-Cigarette Use in Illinois and Wisconsin — Preliminary Report

Summary and case report - 53 cases

**Figure 3. Emergency Department (ED) Visits for Severe Unexplained Respiratory Illness among Patients 14 to 30 Years of Age, According to Sex, in Illinois Counties in 2018 and 2019.**



# Imaging of Vaping-Associated Lung Disease

THE NEW ENGLAND JOURNAL of MEDICINE

## Radiologists review of 34 cases

- “Ground glass” opacities on Lung CT
- Heterogeneous patterns and pathology



9/11/19

Scans of the lungs of four patients, aged 19 to 49, showing damage to the lungs from vaping devices. New England Journal of Medicine

# Vitamin E Acetate - A possible culprit?

## FDA Advisory

*Information for the Public, FDA Actions, and Recommendations*

- Most samples tested that had THC also had vitamin E acetate
- Vitamin E acetate is a lipid that is used commercially (skin products, in dietary supplements)
- Few data exist on its effects when inhaled

*“While FDA does not have enough data presently to conclude that vitamin E acetate is the cause of the lung illness...the agency believes it is prudent to avoid inhaling this substance.”*



# Products that have been found to contain vitamin E acetate – NY DOH





# ***Vaping Illnesses Increase to 530 Probable Cases, C.D.C. Says***

More than three-fourths of those sickened are male, health officials said, and half are under 25. Missouri reported the eighth death linked to vaping during this summer's crisis.

Sept. 19, 2019

# CDC Update – Sept. 19, 2019

- **Demographic data:** Complete sex and age data on 373 of 530 cases.
  - 72% of cases are male
  - 67% of cases are 18 to 34 years old
  - 16% of cases are under 18 years, 17% are 35 years or older
- **E-cigarette use: What We Know**
  - All reported cases have a history of e-cigarette product use or vaping.
  - Based on initial data from some states we know
    - Most patients reported using e-cigarette products containing THC.
    - Many patients reported using THC and nicotine.
    - Some reported the use of e-cigarette products containing only nicotine.
- **E-cigarette use: What We Don't Know**
  - We do not yet know the specific cause of these lung injuries.
  - The investigation has not identified any specific e-cigarette or vaping product (devices, liquids, refill pods, and/or cartridges) or substance that is linked to all cases.

# CDC Recommendations for the Public

- E-cigarettes should not be used by nonsmokers of any age.
- What about smokers or current e-cigarette users?
  - *“While investigation is ongoing, if you are concerned about these specific health risks, consider refraining from using e-cigarettes.”*
- **Current smokers:** use FDA approved cessation aids.
- **Current e-cigarette users:**
  - “If you are an adult who used e-cigarettes containing nicotine to quit cigarette smoking, do not return to smoking cigarettes.”
  - Don’t use bootleg or street-acquired products
  - Don’t add substances to cartridges or re-use cartridges
  - Monitor yourself for pulmonary symptoms

# CDC Recommendations for Clinicians

- Report cases of severe pulmonary disease of unclear etiology and history of e-cig use in past 90 days to state health dep't.
- Ask patients who vape about pulmonary symptoms

## **I would add**

- Ask patients, especially youth and young adults, about vaping
- Record result in the EHR

# Why is this appearing now?

- **New contaminant in the supply chain of e-cigarettes?**
  - Clustering of cases
  - E-cigs have been sold for years, including to youths, without these cases appearing
  - Apparent association with THC, home-made or street-bought e-liquids that may have new contaminants
- My hypothesis: Most likely due to illicit products, not to commercial e-cigarette products...*but we don't know for sure yet*

# Why is this appearing now?

- **New recognition of a complication of vaping?**
  - Was this a rare event that was not recognized?
  - Are cases be appearing now because
    - New vaping devices can deliver chemicals to the alveoli more effectively AND
    - Daily vaping prevalence has risen among youth?
- **However**, few (any?) cases are associated with commercial nicotine e-cigarettes that have not been tampered with.

# Why is this appearing now?

- **A combination of factors?**

- Vaping impairs lung immune mechanisms, making lungs more susceptible to or less able to handle a 2<sup>nd</sup> insult (infection), increasing risk of acute respiratory distress syndrome (ARDS) when infection occurs

- However,

- Current case definition excludes an infectious cause
- Most cases appear to be associated with non-standard products



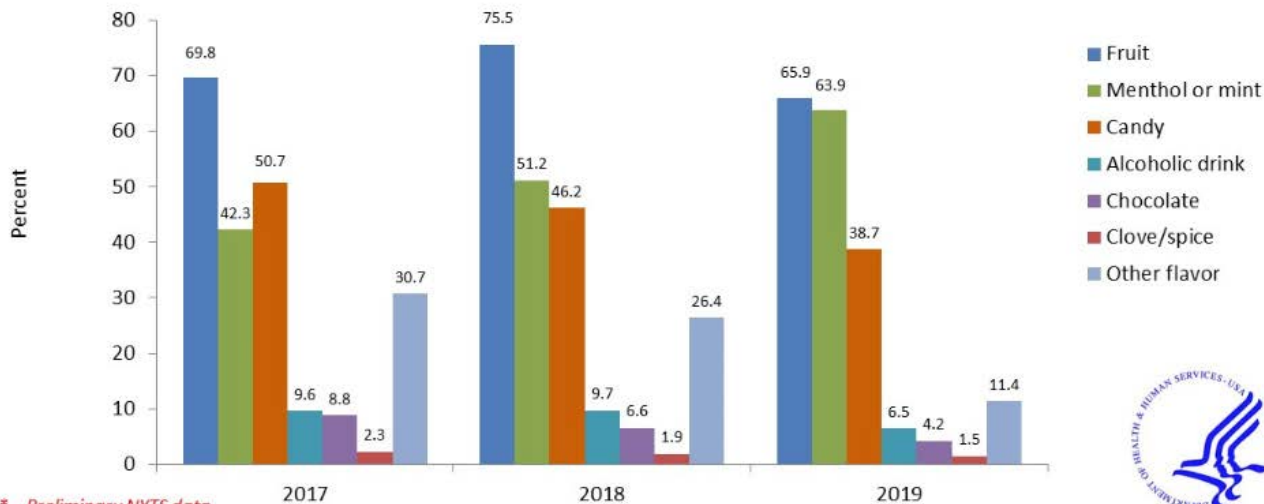
# Next Steps

- Finish the epidemiologic investigations
- In the meantime
  - Focus protective efforts on vaping devices with cannabis or noncommercial nicotine products
  - Stop the epidemic of youth vaping of any product
- These are related but different problems with different solutions

# Potential Policies to Reduce Youth Vaping

- **Supply reduction**
  - Ban flavored e-cigarettes? Or all e-cigarettes?

## FLAVORS POPULAR AMONG HIGH SCHOOL USERS OF E-CIGARETTES\*



**Trump Administration Combating Epidemic  
of Youth E-Cigarette Use with Plan to Clear  
Market of Unauthorized, Non-Tobacco-  
Flavored E-Cigarette Products**

9/11/19

***New York Moves to Ban Flavored  
E-Cigarettes by Emergency Order***

9/15/19

***Massachusetts Temporarily  
Banning Sale of Vaping Products***

9/24/19

## **US DHHS**

All flavored e-cigarettes except tobacco

## **MI, NY**

All flavored e-cigarettes except tobacco and  
mint/menthol

## **MA**

All e-cigarettes (including tobacco flavor)

## **SF**

Ban sales and distribution of all e-cigarettes

# *States Rush to Limit Vaping, but Results Remain Uncertain*

OPINION

## **Regulating e-cigarettes requires a scalpel, not a hammer | Editorial**

Updated: September 16, 2019 - 2:41 PM



The Inquirer Editorial Board | [opinion@inquirer.com](mailto:opinion@inquirer.com)

# Potential Policies to Reduce Youth Vaping

- **Supply reduction**

- Ban flavored e-cigarettes? Or all e-cigarettes?
- Stop illegal sales to minors – how?

- **Demand reduction**

- Raise price of products
- Educate about harms – “denormalize” vaping?
- Help current vapers to quit vaping

# Caution

- **Let's not “throw the baby out with the bath water”**
  - 1 in 2 smokers still die of tobacco related disease
  - Many smokers repeatedly fail to quit with existing treatments
  - E-cigarettes are less harmful than continuing to smoke
  - E-cigarettes can help smokers to quit
    - JUUL-like devices may be the most effective e-cig for cessation
- **Critical Question**
  - How can we realize the potential public health benefit AND minimize the public health harm of e-cigarettes?

# Let's not forget cigarette cessation

- Are JUULs effective smoking cessation tools?
- They might be the best e-cigarette to promote cessation among current cigarette smokers.
  - Efficacy for smoking cessation needs to be tested
  - How important are flavors to their appeal and success with adults?



# Thank you!

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