VAPING, JUULS AND OTHER GEMS OF NICOTINE USE

DENNIS PENZELL, DO, MS, FACP

CLINICAL ASSOCIATE PROFESSOR OF MEDICINE
DR. KIRAN C. PATEL COLLEGE OF OSTEOPATHIC MEDICINE
NOVA SOUTHEASTERN UNIVERSITY

TOBACCO TREATMENT SPECIALIST

2020 ANNUAL FOMA CONVENTION
FEBRUARY 6, 2020
OUTLINE

History of E Cigs
- Invented around 2000
- In USA since 2007
- Produced in China

What are E-cigs/Juuls
E Cig mechanics
Heating vs Heated Tobacco Products
Why is this important
E Acetate/Vaping Injuries-
Electronic vaping associated lung injury
Mechanism of injury
Case
The % of Americans who smoke -- 14%, or 34 million people -- is at an all-time low.

“Doctors could be doing more to help patients quit”, ....Surgeon General Jerome Adams, MD, MPH, said Thursday.
E cig mechanics: Electronic Delivery Systems and Vaping
DEFINITIONS

“Vaping” refers to the heat-induced aerosolization of a liquid using a battery-powered device.

Dripping involves dropping e-cigarette liquid directly onto the hot coils of an e-cigarette which can result in high concentrations of compounds (e.g., formaldehyde and acetaldehyde).

Dabbing refers to vaping marijuana by heating concentrated cannabis oil, called butane hash oil,
ELECTRONIC DELIVERY SYSTEMS
open/closed - heating vs burning

- **Open systems**: allow you to refill them, and include the most intricate and interchangeable systems.
- **Closed systems**: Cannot refill. Use POD
- **Heating** actually heats liquid (Ecigs)
- **Heated tobacco product** - tobacco is heated to a lower temperature than a combusted cigarette to create an aerosol that the user inhales.
Upon inhalation the heater known as the atomiser vaporises the nicotine solution turning it into vapour. The user in turn inhales this to get the similar nicotine hit as a normal cigarette, and a real smoking satisfaction.

3 COMPONENTS:

- **BATTERY**: LED lights up when the smoker draws on the cigarette.
- **‘VAPORIZING’ UNIT**: Where heating occurs.
- **CARTRIDGE**: Contains the liquid nicotine solution.
Electronic cigarettes (e-cig) resemble tobacco cigs and are comprised of three components:

- **Cartridge** that resembles a cigarette filter.
- **Atomizing device’ or ‘heating element’** aerosolizes the flavor solution and turns the liquid solution into the inhaled substance.
- **Battery** activates the heating element.
<table>
<thead>
<tr>
<th>Product</th>
<th>Description</th>
<th>Some Brands</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disposable e-cigarette</td>
<td>Cigarette-shaped device consisting of a battery and a cartridge containing an atomizer to heat a solution (with or without nicotine). Not rechargeable or refillable and is intended to be discarded after product stops producing aerosol. Sometimes called an e-hookah.</td>
<td>NJOY, OneJoy, Aer Disposable, Flavorvapes</td>
</tr>
<tr>
<td>Rechargeable e-cigarette</td>
<td>Cigarette-shaped device consisting of a battery that connects to an atomizer used to heat a solution typically containing nicotine. Often contains an element that regulates puff duration and/or how many puffs may be taken consecutively.</td>
<td>Blu, GreenSmoke, EonSmoke</td>
</tr>
<tr>
<td>Pen-style, medium-sized rechargeable e-cigarette</td>
<td>Larger than a cigarette, often with a higher capacity battery, may contain a prefilled cartridge or a refillable cartridge (often called a clearomizer). These devices often come with a manual switch allowing to regulate length and frequency of puffs.</td>
<td>Vapor King Storm, Totally Wicked Tornado</td>
</tr>
<tr>
<td>Tank-style, large-sized rechargeable e-cigarette</td>
<td>Much larger than a cigarette with a higher capacity battery and typically contains a large, refillable cartridge. Often contains manual switches and a battery casing for customizing battery capacity. Can be easily modified.</td>
<td>Volcano Lavatube</td>
</tr>
</tbody>
</table>
DEFINITIONS

- E-cigarettes typically contain nicotine, flavorings, marijuana

- May be referred to as “e-cigs,” “vapes,” “e-hookahs,” “vape pens,” “mods,” tanks, or electronic nicotine delivery systems (EDS)
Resemble items: cigarettes, USB flash drives, pens, and flashlights;

E-cigs used for dabbing are sometimes called "dab" pens.
Electronic Cigarettes

- Both the particulate and gas phases are mixtures of chemical substances in e-cig aerosols.
- The e-cig aerosol simulates cigarette smoke.

ELECTRONIC DELIVERY SYSTEMS

- Varying nicotine concentrations in the solution

- Varying volumes of solution in the product,

- Different carrier compounds: propylene glycol w/wo glycerol

E-CIG “SMOKE”

VAPOR???
gaseous state of a substance.

AEROSOL???
is a suspension of fine particles of liquid, solid or both in a gas.
Although some classes of e-cigs are marketed as nicotine-free products, even “nicotine-free e-cigarettes” have nicotine.
Secondhand E-Cigarette Aerosol Exposure

Thirdhand aerosol

- solvent and battery output voltage
- concentration of juices
- coil for heating
E CIGARETTES

- Vapors from EC contain toxic and carcinogenic carbonyl compounds.

- Both solvent and battery output voltage significantly affect dosing.
What is a JUUL?

- JUUL (pronounced “jewel”) is a brand of e-cigarette made by JUUL Labs Inc.

- JUUL has grown quickly in popularity since introduction to the market in 2015,

- JUUL’s popularity among youth raises significant concerns for pediatric health.
JUUL Characteristics:

- JUUL is a sleek, small e-cig that resembles a flash drive.
- JUUL does not look like a traditional cigarette.
…all flavors can continue to be sold in devices that cannot be refilled and are designed to be disposed of after the flavored nicotine has run dry.
Anatomy of a Pod-Based E-Cig

These cartridges/pods do contain **NICOTINE**!
JUULS

- Greatest market share of any e-cigarette in the U.S. by the end of 2017.

- Other companies are now also starting to sell e-cigarettes that look like USB flash drives.
Due to their size, are discreet, can be easily concealed.

JUUL operates by heating a “pod” of e-liquid containing nicotine, flavorings and other substances.

When heated, the e-liquid creates an aerosol which is inhaled by the user.
Juul allows high levels of nicotine to be inhaled more easily and with less irritation.

2/3 of JUUL users aged 15-24 do not know that JUUL always contains nicotine.
JUULS

- JUUL comes in youth-friendly flavors, including mango, mint and fruit-medley.
- Tobacco industry has used flavors to attract youth to their products.
JUULS

- JUULS are highly addictive.

- The concentration of nicotine in JUUL is more than 2x the concentration found in other e-cig,

- The addictive potential is so high that the US Surgeon General has declared that youth use of nicotine in any form is unsafe.
JUUL users have a significant risk of becoming cig smokers.
JUULING is increasingly common in high school and college campuses.

Youth are using JUUL in classrooms, hallways and restrooms, and are sharing devices with their peers.
This social use encourages non-users to try JUUL.

Enables students who are too young to purchase these products, or who could not otherwise afford them, to access them through peers.
Marijuana vaping among adolescents in the United States increased from 2018 to 2019.

An absolute increase of more than 6.5% in 12th graders, according to survey results published in JAMA.
A 17-year-old Bronx boy whose death was disclosed by New York State officials on Tuesday is the first teenager in the United States to die of a vaping-related illness, according to federal and state data.
Vaping Kills a 15-Year-Old in Texas
WHY IS THIS IMPORTANT?

- Kid-friendly flavors.
- Can also be used to deliver other drugs, marijuana.
- Most commonly used tobacco prod among youth.
- E-cig use has incr 78% among HS during the past yr.
- 5 million middle and hs kids were current users.
WHY IS THIS IMPORTANT

• Nicotine harms the developing adolescent brain.
  • Affects learning /attention.
  • Future addiction to other drugs.
  • Exposure to metals volatile compounds.
  • In addition, anxiety, depression, attention-deficit/hyperactivity disorder, and other mental or behavioral health conditions were common among all EVALI patients

MMWR 2019
Risk of Poisoning:

Less than 1/2 tsp of liquid nicotine can be fatal to a toddler.

Law requires that liq nicotine sold in childproof packaging.
A QUICK HISTORY OF E-CIGS

Early 2000's

2003

2005

2008

2010

2011

2012

2013

2014

First e-cig adverse event reported to FDA

Tried by 3.3% youth

1 call/month to Poison Control

Tried by 6.8% youth

215 calls/month to Poison Control
ASCO’s Cancer Opinion Survey is the finding:

- 3/10 young adults say flavored are less damaging than unflavored
- 1 in 5 said e-cigs are not addictive or dangerous or harmless.
The greater number of advertising sources, the more likely of kid’s intention to smoke and vape.
Growth in E-Cigarette Use

- High School Students
- All Students
- Middle School Students

Percentage of youth who use e-cigarettes

Source: National Youth Tobacco Survey 2011–2018
Notes: In 2014, changes were made to the e-cigarette measure to enhance its accuracy.
VIT. E ACETATE/ ELEC VAPING ASSOCIATED LUNG INJURY

NEJM 2019
As of January 14, 2020, 2,668 hospitalized cases of EVALI. Electronic Vaping Associated Lung Injury. This is an increase of 66 cases since January 7.

- Median age 24 years old (range 13–85 years)
- 76% were under the age of 35.
- A majority of EVALI patients were male (66%).
VIT. E ACETATE/ ELEC VAPING
ASSOCIATED LUNG INJURY

All EVALI pts have reported a history of using e-cig or vaping

THC-containing e-cig, or vaping, products, particularly from informal sources like friends, family, or in-person or online dealers, are linked to most of the cases and play a major role in the outbreak.
Emer department (ED) visits and hospitalizations suggest that the EVALI outbreak began in June 2019.

Cases have been declining since a peak in September.
Vitamin E Acetate in Bronchoalveolar-Lavage Fluid Associated with EVALI Directly Linked to Vaping Injury: CDC

- **Vitamin E acetate** was identified in BAL from 48 of 51 case patients (94%) in 16 states.

- Not in such fluid obtained from the healthy comparator group.
Vitamin E Acetate in Bronchoalveolar-Lavage Fluid Associated with EVALI
Directly Linked to Vaping Injury: CDC

- Pts reported vaping THC products in the 90 days before the onset of illness.

- Nicotine or its metabolites were detected in 30 of 47 of the case patients (64%).
First is a chemical change that will disrupt surfactant, i.e., the material on the lining of the lungs that might interfere with the lung’s ability to expand.

The second is a chemical injury caused by a by-product of Vitamin E acetate. Breakdown to ketene cause irritation.
Prefilled cartridges obtained on the street or from friends or dealers are linked to most of the cases EVALI and play a major role in the outbreak.
Vitamin E Acetate

- Other substances and product sources are being investigated,

- refrain from the use of all e-cigarette, or vaping, products.

- Nejm 12/20
Histopathological features of acute lung injury have been described, including

- diffuse alveolar damage,
- acute fibrinous pneumonitis, and
- organizing pneumonia.
READMISSIONS AND DEATHS
PROMPT GUIDELINE CHANGES

1) confirming no clinically significant fluctuations in vital signs for at least 24–48 hours before discharge;

2) ensuring outpatient primary care or pulmonary specialist follow-up, optimally within 48 hours of discharge (previously recommended within 2 weeks of discharge);

3) planning for discharge care, early follow-up, and management of any comorbidities;

MMWR 12/20/19
4) arranging posthospitalization specialty care;

5) following best practices for medication adherence; and

6) ensuring social support and access to mental and behavioral health and substance use
Unknown
Elect Vaping Acute Lung Infection

- Can manifest over several weeks.
- ----- Gastrointestinal symptoms: (N/V)
- ----- Respiratory symptoms: (SOB)
- ----- Chest Pains
- ----- Fever,
- ----- Tachycardia,
- ----- Elevated white blood cell count
- ----- Absence of an identifiable infx disease. (fatigue, fever, weight loss)
Many patients have sought initial care in ambulatory settings, some with several visits, before hospital admission.
A 22-year-old man

7 days of progressive nausea, vomiting, diarrhea, subjective fevers.

Shortness of breath, pleuritic chest pain, and a dry cough.

Three days previously, his primary care physician had prescribed amoxicillin.

His medical history was significant for mild to moderate anxiety and childhood asthma.

In the emergency department, the patient denied smoking cigarettes but admitted to smoking marijuana.
The patient presented t. 101.1°F,
heart rate 103 beats/min,
blood pressure 113/71 mm Hg,
respiratory rate 18 breaths/min, and
SpO₂ 89% on room air.
Leukocyte count 16.1 K/µL (95.3% neutrophils),
C-reactive protein 38.9 mg/L, and
Erythrocyte sedimentation rate 87 mm/h were noted on laboratory testing.
The chest x-ray (CXR) showed bibasilar consolidative opacities and bilateral hilar adenopathy.
An extensive work-up for infectious disease was unrevealing,

Antibiotic treatment did not resolve symptoms.

**Patient admitted to using both nicotine- and THC containing e-cig, or vaping, products multiple times per day.**

This history supported the diagnosis of e-cig, or vaping, product use–associated lung injury (EVALI)
When EVALI is considered, it is important to inquire about use of e-cigarette, or vaping, products.

- Include in hx the source of the product, delivery system (e.g., vape pen), duration and frequency of use,
- Time of last use .
- A urine toxicology screen, including for THC, may help in assessing exposure if a reliable history is unavailable.
Patients with EVALI often require supportive care, and treatment with corticosteroids may be beneficial for some patients.

- Admit if respiratory distress, comorbidities, or hypoxia
- CDC says admit patients with saturations <95% on room air.
- ½ admitted to icu/ 1/4 intubated
- Clinical improvements after corticosteroids
With no specific clinical or diagnostic test for EVALI, hospitalists must maintain a high level of suspicion for such injury and assess for other disorders that present similarly such infx etc.
CDC recommendations to not use e-cigarette, or vaping, products containing THC.

i.e. Those obtained from informal sources friends, family, illicit market, ingredients are unknown/variable.

MMWR. Published online November 8, 2019. Full text
You Can Make A Difference

- A brief **3 minute** conversation with a health care provider followed by a referral to cessation services can **more than double** the chances of quitting their tobacco use.

- **Ask** every patient about their tobacco use

- **Advise** patients of the benefits of quitting

- **Refer** to tobacco cessation services

Source: Treating Tobacco Use and Dependence - Clinical Practice Guideline, 2008 Update
USDHHS - Public Health Service
Where can you refer patients?

- **Local** Group Cessation Programs offered **FREE** in **every county** in Florida
- Group Quit programs offered through your local **AHEC** and Tobacco Free Florida
- 877-848-6696, ahectobacco.com
- Free NRT – Patches, Gum, Lozenges
- Groups facilitated by Tobacco Treatment Specialists
- **Statewide**: Tobacco Free Florida’s Phone Quit (over the phone counseling) and Web Quit (online cessation program)
QUIT YOUR WAY

PHONE QUIT
A Quit Coach® is waiting for your call to help you on your journey to be tobacco-free.
1-877-U-CAN-NOW
1-877-822-6669
LEARN MORE

GROUP QUIT
Register for a session with trained facilitators along with others who want to quit like you.
LEARN MORE

WEB QUIT
Try Web Quit. Get access to virtual tools, tips and support that will help you quit tobacco.
LEARN MORE

MORE QUIT TOOLS
But wait, there’s more ways to quit!
LEARN MORE
SUMMARY OF CURRENT RECS FOR CLINICAL GUIDANCE

- Use tobacco cessation techniques A-A-R

- E cig questions should be put into all H/P as well as other tobacco use.

- We need our own education.

- We must be prepared to answer questions etc.