Electronic Nicotine Delivery Systems (ENDS) and COVID-19 Webinar

September 7, 2022

Housekeeping

- All participants muted upon entry
- Engage in chat
- Raise hand if you would like to unmute
- Meeting is being recorded
- Slides and recording link will be sent via email

National Center for Health in Public Housing

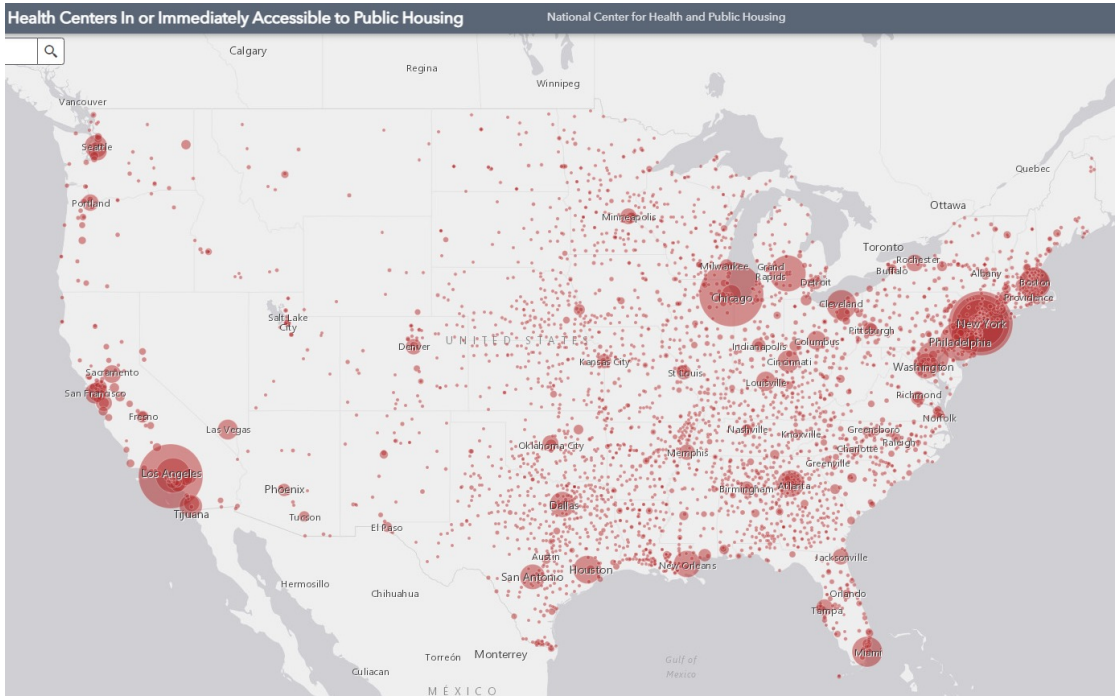
- The National Center for Health in Public Housing (NCHPH), a project of North American Management, is supported by the Health Resources and Services Administration (HRSA) of the U.S. Department of Health and Human Services (HHS) under grant number U30CS09734, a National Training and Technical Assistance Partner (NTTAP) for $2,006,400, and is 100% financed by this grant. This information or content and conclusions are those of the author and should not be construed as the official position or policy of, nor should any endorsements be inferred by HRSA, HHS or the U.S. Government.
- The mission of the National Center for Health in Public Housing (NCHPH) is to strengthen the capacity of federally funded Public Housing Primary Care (PHPC) health centers and other health center grantees by providing training and a range of technical assistance.

NCHPH
National Center for Health in Public Housing

Health Centers Close to Public Housing

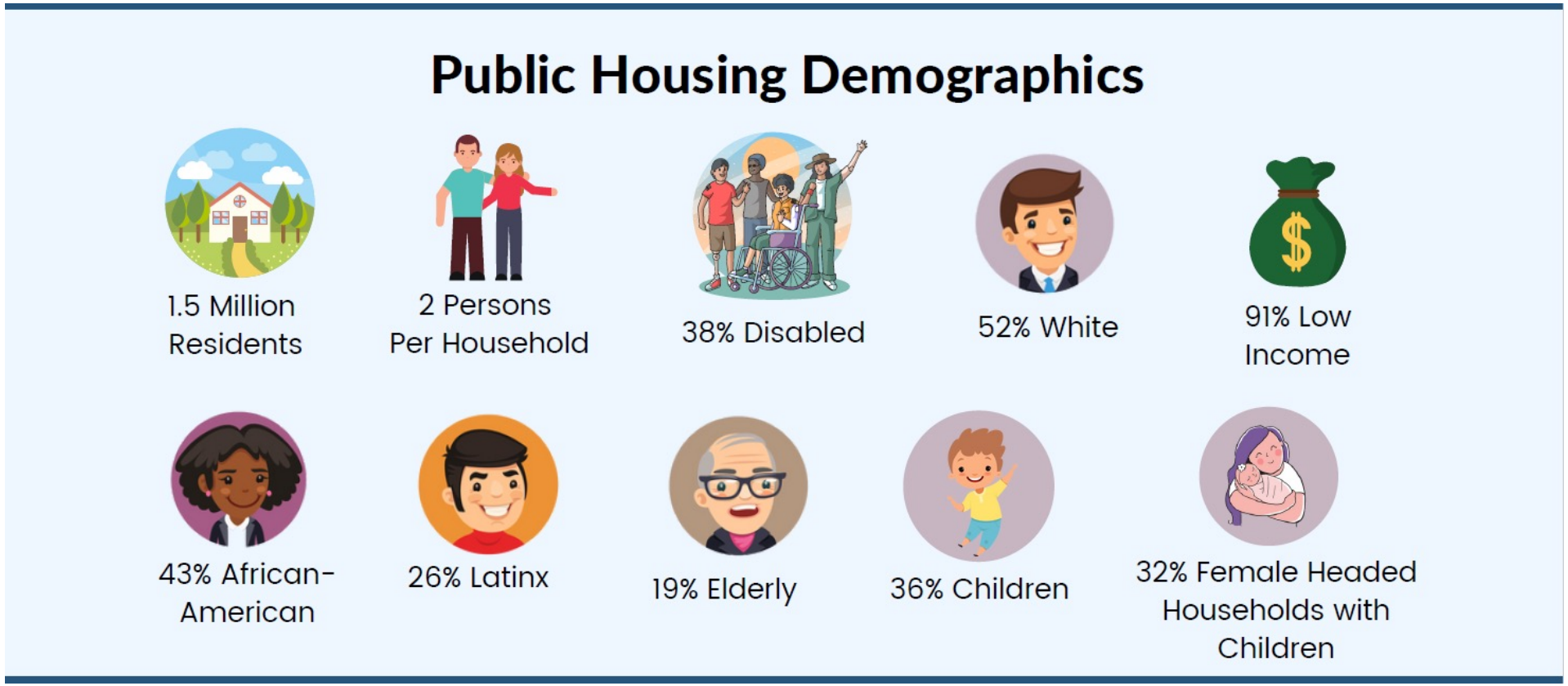
- 1,373 Federally Qualified Health Centers (FQHC) = **30 million patients**
- 458 FQHCs In or Immediately Accessible to Public Housing = **5.7 million patients**
- 108 Public Housing Primary Care (PHPC) = **911,683 patients**

Source: [2021 Health Center Data]



Source: [Health Centers in or Immediately Accessible to Public Housing Map]

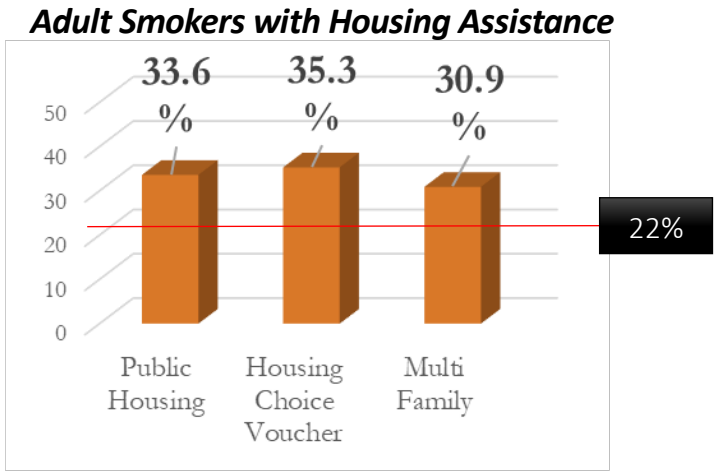
Public Housing Demographics



Source: [2022 HUD Resident Characteristics Report]

A Health Picture of HUD Assisted Adults, 2006 -2012

Adults in HUD-assisted housing have higher rates of chronic health conditions and are greater utilizers of health care than the general population.



Source: Helms, V. E., 2017, Sperling, J., & Steffen, B. L.

	HUD-Assisted	Low-income renters	All Adults
Fair/Poor Health	35.8%	24%	13.8%
Overweight/ Obese	71%	60%	64%
Disability	61%	42.8%	35.4%
Diabetes	17.6%	8.8%	9.5%
COPD	13.6%	8.4%	6.3%
Asthma	16.3%	13.5%	8.7%

Health Center 2021 Diagnoses and Services Rendered

Mental Health Conditions and Substance Use Disorders

- Tobacco use disorder diagnoses
  - FQHCs**: 1,120,816 (3.7%)** Number of Patients
  - IOATs: **918,405 (16%)** Number of Patients
  - PHPCs: **32,161 (3.5%)** Number of Patients

Frank Vitale, MA

National Director, Pharmacy Partnership for Tobacco Cessation; Clinical Assistant Professor, Purdue College of Pharmacy

Electronic Nicotine Delivery Systems

Latest Update

Objectives

- *Upon successful completion of this activity, participants should be able to:*
  - Describe the various electronic nicotine delivery systems currently on the market, how they work, and what chemicals they contain
  - Review the current science on ENDS and their role in cessation
  - Clearly counsel a patient on the efficacy and safety of using vaping for tobacco cessation
  - Articulate the most successful way to quit smoking

Why Discuss the Topic?

- Use of vapes and ENDS has exploded over the last decade
  - Increased internet and brick/motor presence
  - Over 460 current brands with hundreds of variations
  - Over 7,000 flavors
- Misconceptions exist about their safety and efficacy
  - Many think they are an effective alternative to approved cessation methods
  - Many think they are a safe alternative to approved cessation medications
- Health professionals are fielding questions about their use
  - Most HCP's don't know how to respond

Covid and ENDS

- Of young adults already vaping in 2020:
  - 16.8% increased use
  - 44.4% decreased use
  - 38.9% no change
- Of all those currently vaping (3/22):
  - 26% report beginning as a result of the pandemic

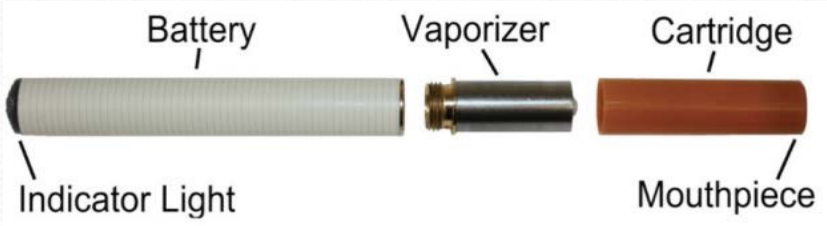
Prev Med. 2022 Jun; 159: 107059; Morning Consult, 3/24/22

What are ENDS?

- Battery-operated devices that create a vapor for inhalation
  - Simulates smoking but does not involve combustion of tobacco
  - Heats the nicotine liquid/salt to produce "smoke"
- Generally similar in appearance to cigarettes, cigars, pipes
- Most are made in China
- Also known as:
  - E-cigarette
  - E-hookah, Hookah pen
  - Vapes, Vape pen, Vape pipe

First Generation

- Power source
  - Rechargeable or disposable battery
- Electronic atomizer/vaporizer
  - Heating element vaporizes liquid at temperatures 65-120 °C
- Cartridge containing liquid solution
  - Propylene glycol
  - Glycerin
  - Flavorings (Thousands of choices)
  - Nicotine (0-36 mg/mL)….can be easily manipulated



Further Iterations

- **Disposable** Cigarette-shaped;
  battery + cartridge with atomizer; not rechargeable

- **Rechargeable** Cigarette-shaped; rechargeable
  battery connects to atomizer; often contains element to regulate length/frequency of puffs

- **Pen-style** Larger device, often with
  higher capacity battery; refillable cartridge;
  manual switch to regulate length/frequency of puffs

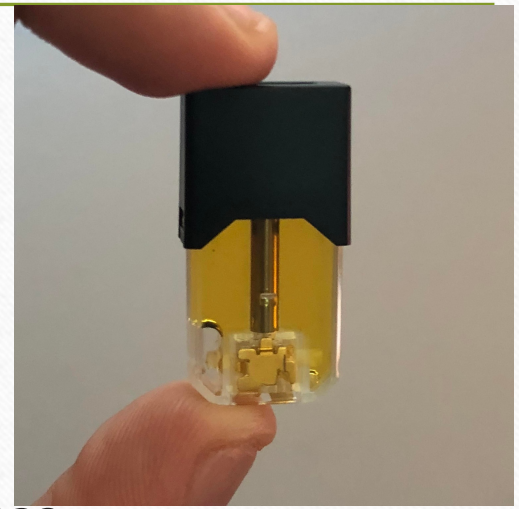
- **Tank-style** Much larger; higher capacity battery;
  large refillable cartridge; easily modified

Nicotine Pod Systems

- Nicotine stored in small plastic cartridges (pods)
  - Use nicotine salts derived from tobacco
  - Less harsh than tobacco smoke
- Compact Design
  - Battery powered
  - Closed system: prefilled, disposable
  - Open system: Fillable, can customize flavor

Juul

- Looks like a flash drive (pod)
- Plugs into a USB port on devices
- Heats liquid nicotine to create a vapor
- One pod roughly equivalent to a pack of cigarettes
- Originally had many flavors; now only menthol and tobacco
- Refillable!



PUFF BAR

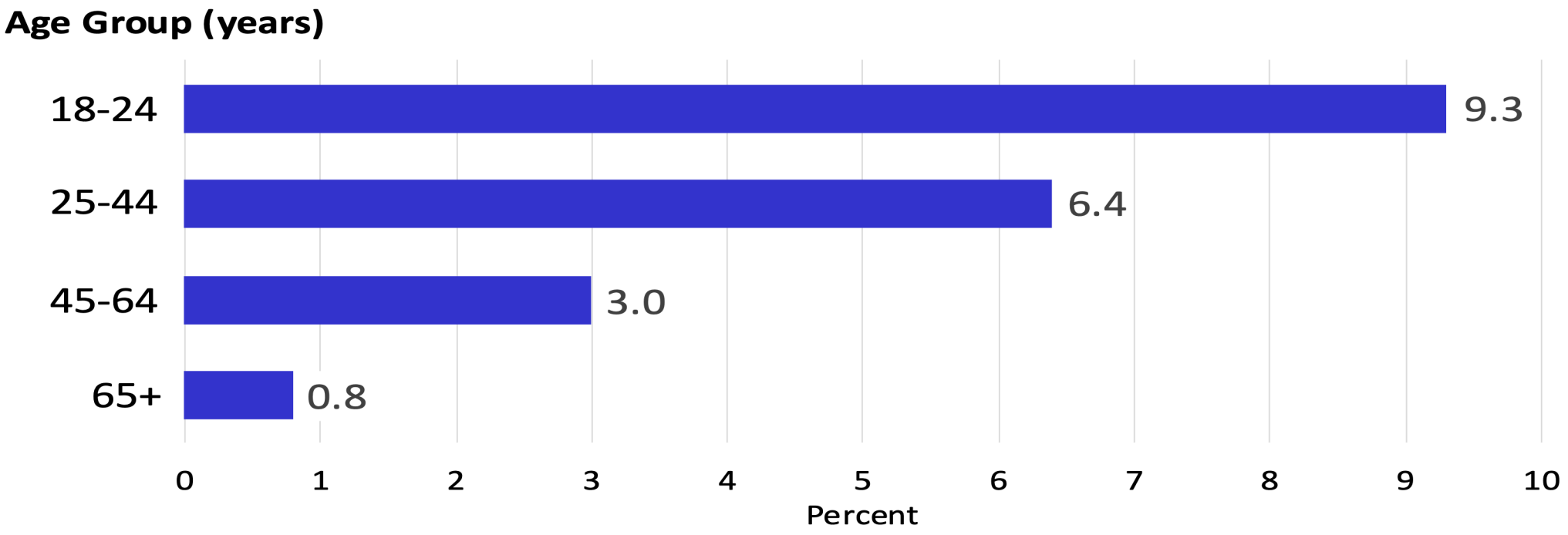
- Mimics Juul
  - Heats nicotine salts into a vapor
  - Resembles a flash drive
- But are **disposable**
  - Skirts regulations
  - Still in many flavors

What are Puff Bars? (truthinitiative.org)

Current Market Share 2022

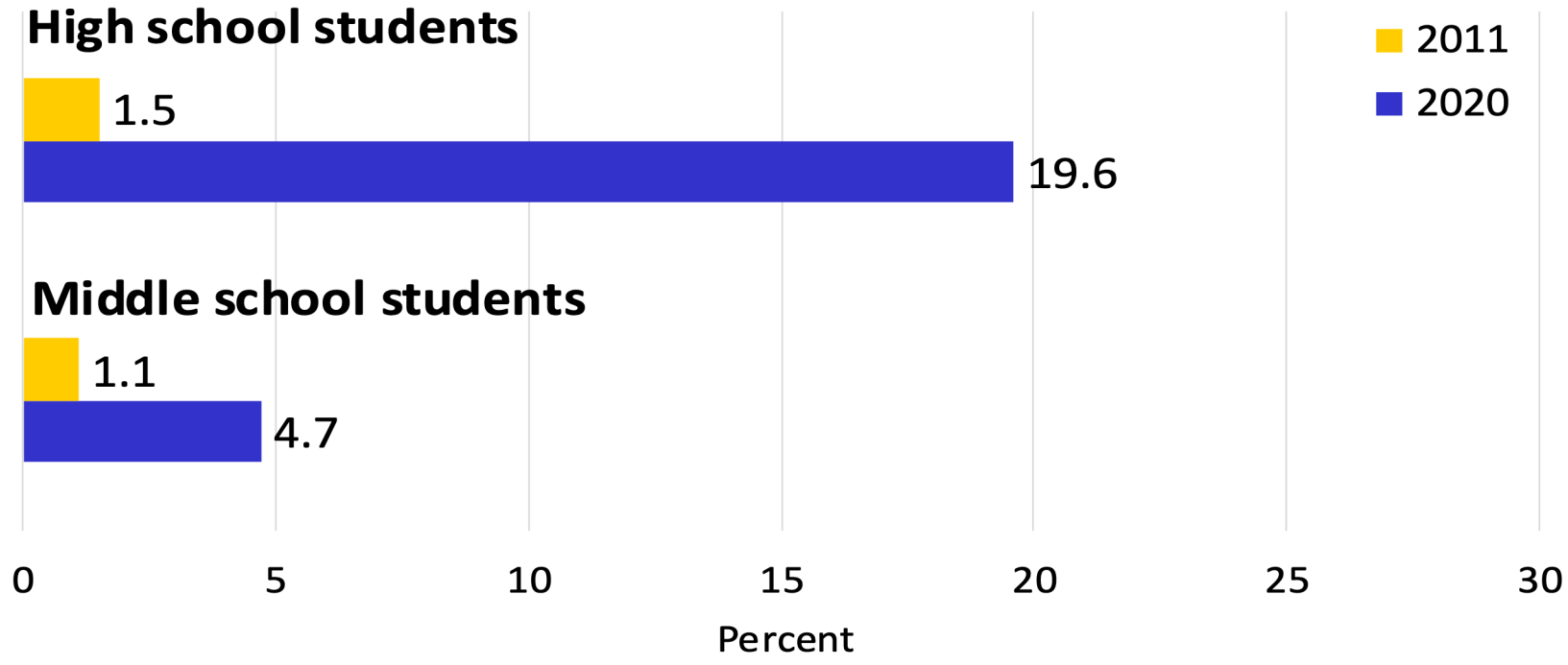
- Vuse Alto: 33.4%
- Juul: 33%
- Njoy Ace: 2.4%
- All others total: 31.2%

CURRENT E-CIGARETTE USE US ADULTS (2019)



Cornelius ME, et al. (2020). *MMWR* 69:1736–1742.

PAST MONTH E-CIGARETTE USE U.S. MIDDLE & HIGH SCHOOL STUDENTS



Centers for Disease Control and Prevention (2015). *MMWR* 64:381–385.
Wang et al.(2020). MMWR 60:1310–1312.

Misconceptions

- "I'm just vaping flavors."
  - "Vapes don't contain nicotine"
- "Other flavors are not harmful. Only tobacco is."
- "Vaping is safe"

"A lot of youth are misinformed about what's in their e-cigarettes" (truthiniative.org)

Major Tobacco Companies Are Now Involved

Marketing

- Same tactics as the tobacco companies used to advertise cigarettes:

Sex appeal

Masculinity

Femininity

"Coolness"

Vapor Shark E-Cigarette Billboard, Florida, 2013

Approved Products 6/22

- FDA has purview
  - Will it help adults quit?
- Reject hundreds of thousands of products
- Approved:
  - NJOY (6 products)
  - VUSE (6 products)
  - Logic Technology (8 products)

Latest Regulations

- As of 6/24/22, FDA bans Juul:
  - "insufficient and conflicting data from the company about potentially harmful chemicals that could leach out of Juul's e-liquid pods."

    NY Times, 6/24/22
  - Did not have enough evidence to rule on health risks
- Company appealed 6/25
  - Stay issued
  - As of current date, no decision

What's In ENDS

OVER 466 BRANDS AND 7,000+ UNIQUE FLAVORS

First, What's in a Cigarette?

Carbon Monoxide	**Formaldehyde Lead**	**Polonium 210**
Acetone Butane	**Ammonia Insecticides**	**36 Carcinogens**
Naphthalene Urea	**Tar**	**Nicotine**

Plus over 4,000 other toxins

Major Components

- **Propylene glycol** may cause respiratory irritation and increase the risk for asthma
  - Propylene glycol is the primary ingredient in **anti-freeze**
  - Little is know of the long term effects of inhalation
- **Glycerin** may cause lipoid pneumonia on inhalation
- **Nicotine** is highly addictive and can be harmful
  - User can easily manipulate the nicotine level
- **Carcinogenic substances** are found in some aerosols
- Many unknown particles and chemicals

Diacetyl

- Flavoring chemical
- Causes bronchiolitis obliterans or "popcorn lung"
  - Scars smallest bronchiole
  - Results in impeded lung flow
  - Can cause:
    - shortness of breath
    - coughing
    - wheezing
- Originally identified in workers who inhaled artificial butter while making microwave popcorn
- Found in 75% of vapor flavors tested

Flavoring Chemicals in E-Cigarettes: Diacetyl, 2,3-Pentanedione, and Acetoin in a Sample of 51 Products, Including Fruit-, Candy, and Cocktail-Flavored E-Cigarettes: *Environ Health Perspect*; DOI:10.1289/ehp.1510185 Joseph G. Allen, Skye S. Flanigan,

Carcinogens

- E-cigarette liquids contain small amounts of nitrosamines
- E-cigarette aerosols contain the following carcinogens
  - Formaldehyde
  - Acetaldehyde
  - Acrolein
  - Chromium
  - Nickel
- Levels of most substances lower than found in tobacco smoke
  - No safe level of exposure has been determined
- With intense heating higher amounts of formaldehyde and acetaldehyde are generated
  - Similar to concentrations in tobacco smoke

Bhatnagar et al., Circulation 2014;130:1418–1436. Gronkiewicz et al., Tob Control 2014;23:133–139. Kosmider et al., Nicotine Tob Res 2014;16:1319–1326.

However:

- There are hundreds of vaping liquids, salts, etc.
- Many are made at home or in small business
- There is little/no regulation of these chemicals/additives/manufacturing

So,

THERE IS NO WAY TO KNOW EXACTLY WHAT IS IN MOST DEVICES

Additional Considerations

- Indoor Air Pollution
  - ENDS are not emission-free
  - During vaping, compounds and particles emitted into the indoor air include:
    - Propylene glycol
    - Glycerin
    - Heavy metals
  - Long-term safety of second-hand exposure to e-cigarette aerosols is unknown
  - Most places that ban smoking ban use of ENDS
- Increasing reports of battery explosions while in use and:
    - In pants pockets
    - On airplanes

Considerations (cont.)

- Accidental poisoning
  - Primarily in children
  - Bottle of nicotine liquid generally contains 6-36mg. nicotine/ml.
    - Lethal oral dose in adults: 40-60 mg.
    - Life threating oral dose in children: 6mg.
  - Calls to poison control centers related to liquid nicotine
    - Increased 733% from 2012 to 2014
    - Over 5000 exposures reported in 2021

N

National Poison Data System, American Association of Poison Control Centers: 5/22

Efficacy for Cessation

- Limited evidence-based research showing cessation efficacy
  - Limited FDA approval
  - Industry, however, implicitly markets them as cessation devises
- Review of 13 studies to date: 10/19
  - "E-cigarette use was not significantly associated with increased smoking cessation among cigarette smokers."
- Review of 38 studies in 1/16: 38% of vapers ***less*** likely to quit
- Rather, dual or continued use:
  - In 2013 study, 76% of E-cigarette users also smoked
  - In one trial 80% still using ENDS at the end of one year

.Are electronic nicotine delivery systems (ENDs) helping cigarette smokers quit?—Current evidence, JOPM,V.49, Issue 3. 3/20 E-cigarettes and smoking cessation in real-world and clinical settings: a systematic review and meta-analysis Sara Kalkhoran PhD, Stan Glantz, The Lancet Respiratory Medicine, 14 January 2016

Safety

- Maybe *safer* than combustible cigarettes but can not be considered safe
  - Contain many know toxins and many unknown chemicals
- With 7 FDA approved cessation medications no need to use ENDS
- To date, we do not advocate using ENDS to quit smoking

What are They Doing in the UK?

- Royal College of Physicians recommends usage:
  - Based on report *E-Cigarettes: An Evidence Update*
  - Harm Reduction:
    - 95% less harmful than smoking
    - But probably more dangerous than NRT
  - Smokers who have tried other methods and failed could be referred to use E-Cigarettes **"when supported by a cessation service."**

E-Cigarettes: An Evidence Update, McNeill A, Brose LS, Calder R, Hitchman SC , Hajeck P, McRobbie H a publication of Public Health England

TOBACCO DEPENDENCE: A 2-PART PROBLEM

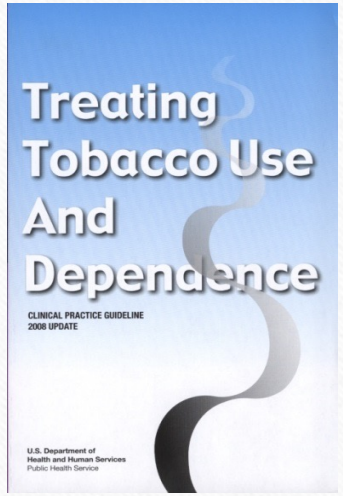
Tobacco Dependence

Behavioral	**Physiological**
The habit of using tobacco ↓ Treatment Behavior change program	The addiction to nicotine ↓ Treatment Medications for cessation

Treatment should address the physiological **and** the behavioral aspects of dependence.

Stopping ENDS use

- The same as quitting smoking:
  - Combine a behavior change program with
  - A cessation medication



Choose a Cessation Medication

OTC	Prescription
Nicotine Patch	Nicotine Inhaler
Nicotine Gum	Nicotine Nasal Spray
Nicotine Lozenge	Bupropion
	Varenicline

NICOTINE PATCH

Available: 21 mg, 14 mg, 7 mg (OTC)

Pros:

- Once-daily dosing
- Delivers consistent nicotine levels over 24 hours
- Can be used in combination with other agents
- Of all nicotine replacement products, use is least obvious
- Relatively inexpensive (generic formulation)

Cons:

- Cannot be titrated to acutely manage withdrawal symptoms
- Not recommended for use with dermatologic conditions

NICOTINE GUM and LOZENGE

Available: 2 mg, 4 mg; various flavors (OTC)

Pros:

- Oral substitute
- Can titrate to manage withdrawal symptoms
- Might delay weight gain
- Used in combination with other agents to manage situational urges
- Relatively inexpensive (generic formulations)

Cons:

- Frequent dosing (short-acting) = risk for poor adherence
- Gastrointestinal side effects might be bothersome
- Dental work/jaw issues (gum only)
- Proper chewing technique is necessary (gum only)

NICOTINE GUM: DIRECTIONS for USE

NICOTINE INHALER

Available: 10 mg cartridge delivers 4 mg inhaled vapor for absorption across buccal mucosa (Rx)

Pros:

- Oral substitute
- Can titrate to manage withdrawal symptoms
- Mimics hand-to-mouth ritual of smoking
- Can use in combination with other agents to manage situational urges

Cons:

- Frequent dosing (short-acting) = risk for poor adherence
- Cartridges might be less effective in cold environments (≤60°F)
- Cost of treatment (no generic available)

NICOTINE NASAL SPRAY

Available: 10 ml bottle; 0.5 mg per spray (Rx)

Pros:

- Can titrate to more closely manage withdrawal symptoms
- Can use in combination with other agents to manage situational urges

Cons:

- Frequent dosing (short-acting) = risk for poor adherence
- Nasal administration; nasal irritation often problematic
- Not recommended for use with chronic nasal disorders or severe reactive airway disease
- Cost of treatment (no generic available)

BUPROPION SR

Available: 150 mg tablets (Rx)

Bupropion SR is initiated 1 to 2 weeks before the quit date.

Pros:

- Twice-daily oral dosing
- Might be beneficial in patients with depression
- Can use in combination with NRT
- Relatively inexpensive (generic formulations)

Cons:

- Seizure risk is increased
- Several contraindications and precautions / more extensive screening
- Patients must be monitored for potential neuropsychiatric symptoms

VARENICLINE

Available: 0.5 mg and 1.0 mg tablets (Rx)

Pros:

- Twice-daily oral dosing
- Offers a different mechanism of action than other options
- Most effective agent for cessation when used as monotherapy

Cons:

- Nausea (28%): take after eating and with a full glass of water
- Insomnia/sleep disturbances
- Patients must be monitored for potential neuropsychiatric symptoms
- Cost of treatment (no generic available)

Varenicline is initiated 1 week before the quit date.

COMBINATION PHARMACOTHERAPY

- **Combination NRT**

  Long-acting formulation (patch)

  - Produces relatively constant levels of nicotine

  PLUS

  Short-acting formulation (gum, lozenge, inhaler, nasal spray)

  - Allows for acute dose titration as needed for nicotine withdrawal symptoms

- **Bupropion SR + Nicotine Patch**

Combination therapy increases dosing flexibility and overall plasma nicotine concentration.

COMBINATION NRT:
RECOMMENDED TREATMENT REGIMENS

- **Nicotine patch**

  Dose: 21 mg/day x 4–6 wks. → 14 mg/day x 2 wks. → 7 mg/day x 2 wks.

PLUS

- **Nicotine gum or lozenge** (2 mg/4 mg; based on time-to-first cigarette)

  Dose: Use 1 piece q 1–2 hours as needed (use at least 4-5/day)

OR

- **Nicotine inhaler** (10 mg cartridge; delivers 4 mg nicotine vapor)

  Dose: Use 1 cartridge q 1–2 hours as needed

OR

- **Nicotine nasal spray** (0.5 mg/spray)

  Dose: Use 1 spray in each nostril q 1–2 hours as needed

Dosing for ENDS Cessation

- If prior smoker:
  - Dose based on prior cigarette consumption
- If new ENDS user:
  - Difficult to determine exact nicotine consumption but:
    - If using ≥ 20 mg of nicotine then 21mg patch
    - If ≤ 20 mg of nicotine then 14 mg patch
    - Consider adding gum/lozenge for breakthrough urges
    - Monitor and rapidly adjust dose as needed

Therapeutic Research Center (2019)Help patients break the E Cigarette Habit *Pharmacist Letter,* December

Behavioral Interventions

- Same as smoking cessation
- Employ coping techniques:
  - Change what you do
  - Change how you think
- Refer to Quit Line if you can not do intervention yourself
  - 1 800 Quit Now
- Many local cessation programs now admitting vapers!

In Conclusion

- ENDS use did increase during Covid
  - What's to come?
- ENDS is an ever evolving area
- Current evidence does not point to using them for tobacco cessation
  - Minimal evidence for efficacy
  - Little evidence for safety
- Extensive evidence that the 7 FDA approved cessation medication plus behavioral counseling is the most effective way to help someone quit!

Smoking Cessation

- Refer to NCHPH Learning Collaborative
  - 2020: 4 lectures
  - 2021: 4 lectures

- https://rny.jqr.mybluehost.me/resources/quality-improvement-learning-collaboratives/

Contact Information

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Upcoming Webinar

- **Preventing Smoking Relapse in the COVID Era Webinar**
- **Learning objectives:**
  - Understand the various challenges dealing with Covid presents to former smokers
  - Review effective strategies to prevent relapse
  - Examine behavioral techniques to help individuals regain abstinence if they do relapse
  - Discuss medication modification recommendations for various relapse scenarios
- **Date:** September 21, 2022 from 12:00 – 1:00 pm EDT
- **Registration Link:** https://us06web.zoom.us/webinar/register/WN_jAh6sVwHTRuNDru9_HLonA

Q&A

If you would like to ask the presenter a question, please submit it through the chat box on your control panel or use the “raise hand” icon in the reactions tab and your line will be unmuted.

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