**Session Objectives**

- Review the history of e-Cigarettes and Vaping
- Discuss the design and ingredients of e-Cigarettes and Vaping devices
- Review current evidence regarding potential benefits and harms, and public health concerns
- Summarize best practices for primary care providers

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**Emma**

- Emma, 26 year old woman
  - History
    - Began smoking at age 17, 1.5-2 packs per day
    - Worsening cough, decreased exercise tolerance
    - Acute bronchitis yearly over the previous 3 years
    - Unsuccessful attempts to quit smoking in the past

- Emma states:
  - “I have stopped smoking!” with vaping
  - Started at 12mg of nicotine now at 3mg and vaping 5-6 times per day
  - Exercising and not coughing anymore
Madison

- 19 year old woman, sophomore in college.
- Student Health Center - "cold symptoms, sinus pain" x 3 days
- History and PE consistent with viral URI
- During exam – a vaping device is noted tucked into Madison's bra

Madison

- Denies "smoking cigarettes"
- Smokes MJ – "occasionally" < 1-2 per month with friends
- Drinks 2-3 beers on weekend nights:
  - Vapes "once in awhile" – once or twice a week
    - Just nicotine
    - Has never smoked tobacco
- Nicotine gives her a “buzz” and helps her focus and study

E-cigs
E-hookahs
Hookah stick
E-cigars
Mechanical Mods
Vape pens
Vaping devices
Personal vaporizers

*ENDS*
Electronic Nicotine Delivery System

Devices create an aerosol that is inhaled or vaped

Smokeless devices 1st designed over 80 years ago
E-cigarettes introduced in 2006-2007

- 1934 - earliest patent for a inhaler device
- 1965
  - H. A Gilbert - Prototype for current devices
- 2003-2007
  - Designed Hon Lik, 1st commercially produced E-cigarette
- 2006
  - Smokeless E-cigarettes introduced in Europe
- 2006-2007
  - Smokeless E-cigarettes introduced in US
Evolution of device design
4 generations

4th Generation Devices

Devices are easily accessible in stores and online

- Smoke shops – Vape Shops
- Pharmacies
- Convenience stores
- Club stores
- Supermarkets
- Gas Stations
- Mall kiosks
- Military commissary
- Internet sales
- From friends!

Over 400 brands on the market
Over 7760 flavors on market
Most contain toxicants and carcinogens

- Nicotine
- Traditional cigarette: 10-30mg
  - 0.05-3mg actually absorbed
- ENDS varies greatly
- Propylene glycol
- Glycerol (Sugar) – fruit flavoring
- Aldehydes
- Metals
- Tobacco alkaloids, nitrosamines
- Hydrocarbons
- Diacetyl - bronchiolitis obliterans

A popular vapor product:
64.1% Sales Increase over ONE Year

2.2 to 16.2 million
Increased market share 515%
Easy to use, Discrete
High nicotine concentration
Flavored
Similar feel of cigarette

Recent trends show doubling of use in US teens 2017-2018
Almost 60% of adult ENDS users also smoke

- In 2015 – of adult ENDS users
  - 29.8% were former smokers
  - 58.8% were current regular smokers (dual use)
  - 11.4% had never been regular smokers
- 2016 – CDC estimated current ENDS users
  - >2 million US middle and high schoolers had used ENDS in the past 30 days
- In 2018
  - E-cigarettes are the most common tobacco product used among US youth
  - Rates of ENDs nearly doubled – from 11% to >20% of 12th graders
  - Cigarette use declined 11.4%
  - 40% of current ENDS users ages 18-24 years have never been cigarette smokers

The FDA has not approved ENDS for smoking cessation – YET
Consensus: vaping most likely safer than tobacco smoking • more evidence is needed

- Centers for Disease Control and Prevention (CDC) 2018 “E-cigarettes are NOT safe for children, adolescents, pregnant women, and for anyone who is not currently smoking”
- US Preventive Services Task Force (USPSTF) 2015 Grade I: “Current evidence is insufficient to recommend electronic nicotine delivery systems (ENDS) for tobacco cessation - recommends other cessation interventions with established effectiveness and safety”
- American Cancer Society (ACS) 2018
  - Current generation of E-cigarettes are less harmful than smoking tobacco HOWEVER long term harms are unknown
  - Use FDA approved smoking cessation products

Recent study on ENDS and efficacy of smoking cessation – superior to NRT
- 2017 - Royal College of Physicians (UK) and Public Health England
  - Promote ENDS and other NRT for smoking cessation
- 2019 – NEJM 1/30/19
  - UK – 900 smokers
  - ENDS outperformed NRT (like gum, patches) after 2 year with behavioral supports 1.8% vs 9.9%

The New York Times
J ... 1 Suspends Selling Most E-Cigarette Flavors in Stores

FDA
- Raided manufacturers offices to seize documents
- $60 million campaign targeting teen use


https://www.fda.gov/tobacco/products/labeling/productsingredientscomponents/ucm456610.htm
https://www.fda.gov/NewsEvents/Newsroom/PressAnnouncements/ucm620788.htm
ENDS Second hand and Third hand aerosol pollutants
- Residual aerosol that acts as dust on surfaces that can be re-emitted
- Burns and injury
- Toxicants and carcinogens
  - Diacetyl - bronchiolitis obliterans
- Risk to children
  - Increase in unintentional exposures and poisonings from ENDS
  - Nicotine poisoning increasing
  - Nicotine on developing brain
  - Neurotoxic on developing brain
  - Highly addictive in adolescents

Cross-sectional association between ENDS use and MI risk
- National Health Interview Surveys 2014 and 2016
- Increased odds of MI in daily ENDS users
- Dual use of ENDS and cigarettes (most common use) increased odds of MI greater than ENDS use or cigarette smoking alone

E-cigarette use is associated with initiation of smoking in teens
- Teens who have used ENDS are more likely than those who have not used ENDS to start smoking
- Concern: Some teens users of ENDS go on to smoke who would not have started without access to ENDS
- This population now exposed to harms of smoking
- US Surgeon General declared teen ENDS use a public health concern

Possible association between ENDS use and MI risk
- Journal Of Preventive Medicine 2018
- Cross-sectional association between ENDS use and Cigarette Smoking and MI
- National Health Interview Surveys 2014 and 2016
- Increased odds of MI in daily ENDS users
- Dual use of ENDS and cigarettes (most common use) increased odds of MI greater than ENDS use or cigarette smoking alone


ENDS and MJ Rates are increasing in children and teens
- Study in JAMA National Youth Tobacco Survey data (NYTS)
  - Cross-sectional school-based survey of students grades 6-12
  - Among E-cigarette users:
    - HS students, 1 of 3 (1.7 million) and 1 of 4 (425,000) middle schools had ever used cannabis in E-cigarettes
    - Use higher in boys and kids who lived with a smoker
  - New study suggests increased effects from vaped MJ compared to smoked MJ


Serious concerns regarding marijuana on developing teen brain

- National Academies of Science
  - MJ
    - Impacts learning, memory, possible lasting impact on academic achievement
- Recent study compared ETOH and Cannabis on adolescent cognition
  - Cannabis
    - Concurrent and lasting effects on important cognitive functions which appear to be more pronounced than ETOH


Have a conversation with your patients

- Get the facts and stay informed
- For parents:
  - Start a conversation
  - Ask and listen
  - Ask kids what they know and think about ENDS
  - Stress that ENDs are not harmless
- Resources
  - CDC has great information
  - UMMS Website:
    - http://makesmokinghistory.org/dangers-of-vaping/parents/

In Summary

- Use of ENDS is increasing
  - The FDA has declared ENDS use in adolescents an EPIDEMIC
  - ENDS use increasing rapidly among children and adolescents
    - Use of ENDS increases risk of smoking in teens
    - Use MJ seen in Middle School and HS students
    - Carcinogens and toxicants present
  - ENDS as an effective tool for smoking cessation – preliminary findings hopeful but need further study
  - There are known harms and potential harms
    - Most likely less dangerous than cigarette smoking
    - but long-term studies needed
    - Balance harm reduction versus potential harm