Vaping, Juuling, Dabbing

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Vaping by High Schoolers - 2017 YRBS

- **Ever used electronic vapor products**
  - Massachusetts – 44.8%
  - United States – 44.9%

- **Current use electronic vapor products (past 30 days)**
  - Massachusetts – 23.7%
  - United States – 24.1%
Topics: Learning Objectives

- Technology of Vaping
- Business of Vaping
- Toxicology of Vaping & Nicotine
- The Adolescent Brain & Addiction
- Prevention
E-Cigarettes

Other names…
- Electronic Nicotine Delivery Systems (ENDS)
- E-devices
- E-pens
- E-hookahs
- Vaping
- Vape-pipes
- Vape-pens
- “Juice”
Technology of Vaping
E-Cigarettes: Dabbing & Juuling

- Battery-operated
- Delivers nicotine, flavor, other chemicals
- Dabbing: smoking butane hash oil
- Juuling: vaping with small new device
- Aerosol inhaled by user
Marketing: 1st Generation
Marketing: 2nd Generation
Marketing: 3\textsuperscript{rd} Generation
Marketing: 4th Generation
Marketing: 5th Generation
Business of Vaping
E-Cigarettes

- “Safer than cigarettes”??
- Oil or solvent-based liquids
- Bright colors, various flavors
- Highly concentrated
- No child-resistant packaging
Retail Stores
E-Cigarette Flavors

Chocolate Covered Cherries
$7.45
(0 reviews)

Chocolate Peanut Butter
$7.45
(0 reviews)

Maple Cured Tobacco
$7.45
⭐⭐⭐⭐ (2)

Orange Cream
$7.45

Sour Apple
$7.45
(0 reviews)

White Chocolate Strawberry
$7.45
⭐⭐⭐⭐ (1)
Business of Vaping

For comparison... Americans spend $80 billion on cigarettes annually.
Toxicology of the Cloud
How much nicotine?

- 3 mL chamber
- Nicotine Juice: 25 mg/mL
  - 50 mg/mL
  - 75 mg/mL
  - 100 mg/mL
- Sold in up to 1 liter bottles
- 1 e-cigarette: 18-72 mg
- cigarette = 12-30 mg
- cigar = 15-40 mg
- Toxic dose: 1-13 mg/kg nicotine
  - <1 mL can be toxic to a 2 year old
What do you think was in the mist? 51.8% 12th graders thought ‘just flavoring’
A Cloud of Chemicals

Solvents, oils: >40 different chemicals detected in vapor, including carbonyls, metals, nano-particulates, acrolein, aromatic hydrocarbons

Prop 65 chemicals listed in e-cigarette vapors

- Acetaldehyde
- Formaldehyde
- Isoprene
- Toluene
- Lead
- Nickel
- Nicotine
- N-Nitrosonornicotine
Marketing in California

This warning label appears on the bottle of “Vape Jam” e-juice purchased locally by an underage youth.

Warning: This product may contain nicotine, a chemical known to the state of California to cause birth defects, or other reproductive harm. Nicotine is highly addictive. Do not mix this liquid with other products. Do not drink. Do not put on your skin. Keep out of reach of children and animals at all times. This product is intended for use and purchase by persons of legal age. Women who are pregnant or breastfeeding should not use this product. This is not a smoking cessation product. Use at your own risk.

Ingredients: USP Vegetable glycerin. USP propylene glycol. Natural & artificial flavor.
A Cloud of Chemicals

Metals liberated from coil (N=56 user devices) into aerosol (median ug/kg):

Al 16.3
Cr 8.38
Cu 15.1
Fe 21.7
Mn 2.42
Ni 68.4
Pb 14.8
Sb 0.553
Sn 5.65
Zn 515

Olmedo P et al. EHP 2018
Urinary Carcinogens: e-cig adolescent users (average age: 16.4 yrs)

**median for ‘sometimes’ or ‘heavy’ nicotine e-cig users; salivary cotinine levels are shown

Rubenstein ML et al. Pediatrics April, 2018
600 million alveoli can’t be wrong
Bronchiolitis obliterans

diacetyl  2,3-pentanedione  acetoin
Health Effects of Vaping
Nicotine Toxicity, Withdrawal

**TOXICITY**
GI – N&V, Salivate, anorexia, D&D  
CVS – Tachycardia, Hypertension  
Bradycardia, Hypotension, Dysrhythmias  
CNS – confusion, HA, dizzy, seizures, coma  
PNS – sweating, tremors, weakness, fasciculation  
(children - seizures, respiratory failure, death)

**WITHDRAWAL**
craving, anxiety, tingling, HA  
nausea, cramps, wt gain  
insomnia, mood disorders, depression
Vaping Local Effects

- Bleeding gums
- ‘Vapers’ cough’
- Passive vaping - micro-particles
- Long-term effects?
- Pregnancy effects?
Early Adulthood Brain Maturation

- control
- motivation
- reward
- Memory
- emotion
Haven’t we seen this before? (modeling addictive behaviors)
Attractive, Accessible Technology
Peer Pressure
‘The Perfect Storm’

genetics  
epigenetics  
development  
parental style  
education  
environment
Vaping as a gateway drug

- Bold et al (Peds 2018) – 2013-15 survey >800 CT teens - teens initiating vaping 7x more likely to be smoking cigarettes 2 yrs later than those not vaping.

- Soneji et al (JAMA Peds 2017) – meta-analysis of 9 longitudinal studies (N=17,389 teens) OR=3.5 ever used ecigs vs not - subsequent cig smoking.
Prevention?
Prevention by Regulation

- Regulation flavoring & marketing as a public health issue – FDA’s “deeming regulation” on products issued after 2007--- delayed enforcement announced on July 28 2017 ‘for several years’
- Age minimum – 21 years old
- Local: business compliance checking
- Local: ban from schools
Roles of Primary Care Provider

- Ask about e-cigarettes
- Counsel teens
- Counsel parents
- Act as school district consultant
- Support AAP positions on regulation
- Community advocacy
Resources

- www.heathychildren.org
- www.fda.gov
- monitoringthefuture.org
- teens.drugabuse.gov
- schoolleadersnow.weareteachers.com
- headsup.scholastic.com
- Your Friendly Regional PEHSU!
  - https://www.pehsu.net/