



# WHAT IS THE IMPACT VAPING HAS ON ORAL HEALTH?

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## **Course Goal:**

To increase awareness of potentially dangerous oral health effects of vaping and to provide dental hygienists with strategies directed towards reducing the incidence of vaping within out patient populations

## **Course Objectives:**

*Upon completion of the course, the dental professional will gain an understanding of the negative health effects of vaping and be able to:*

- Identify various vaping products and trends in usage.
- Interpret current data regarding vaping prevalence, especially among the young adult population.
- Appreciate and understand the negative health effects of vaping.
- Distinguish between the perceived benefits and known oral health risks of vaping.
- Assess young adults' perceptions/understanding of the oral health effects of vaping.
- Integrate vaping cessation methods into dental hygiene care planning.

## **Slide 21- What are Electronic Cigarettes:**

- A battery-operated device containing an atomizer designed to heat a chemical solution and deliver aerosolized nicotine-containing vapor to its user
- Originally developed in 2003 for smoking cessation
- Available in the US since 2007
- Emerging as a socially acceptable recreation activity to engage in nicotine consumption
- Addicts users faster than cigs

**Slide 22- JUUL Most popular vaping device:**

- Pod-based
- 72% of vaping market share in 2018
- Posted upwards of 1 billion dollars in revenue in 2018
- Proprietary nicotine-salt formulation
- Delivers nicotine 2.7 times faster than other EC
- Nicotine content 0.7ml or 59 mg/ml (~200 puffs)
- Comparable to a pack of cigarettes
- Most popular choice of EC for teens and young adults
- Addiction in as little as **1 pod**

**Slide 23-** JUUL CEO Kevin Burns makes public statement telling non-smokers not to vape or use his company's product:

**Slide 24-** "Don't vape. Don't use JUUL. Don't start using nicotine if you don't have a preexisting relationship with nicotine. Don't use the product. You're not our target consumer."

- JUUL CEO Kevin Burns 8/29/2019

**Slide 25- What is Nicotine?**

- A psychoactive and addictive drug
- Routine nicotine consumption results in physical withdrawal
- Withdrawal symptoms consistent with other chemical dependencies, such as cocaine and heroin

**Slide 26- Besides nicotine, e-cigarettes can contain potentially harmful ingredients, including:**

- Particulate matter that can be inhaled deep into the lungs
  - Flavorants such as diacetyl, a chemical linked to serious lung disease (popcorn lung)
  - Formaldehyde (known carcinogenic)
  - Propylene glycol (found in anti-freeze)
  - Nitrosamines (pancreatic carcinogen)
  - Volatile organic compounds (pulm and cardio dysbiosis)
  - Heavy metals, such as nickel, tin, and lead
- (Source: <https://e-cigarettes.surgeongeneral.gov/>)

**Slide 27- What has been determined through existing research:**

- EC use is also known as vaping
- Initially used for smoking cessation
- Has become a popular recreational activity
- Majority of users under the age of 34
- Perceptions of overall health risk are generally low
- Perceptions of oral health risks has not been defined
- **\*\*\*40% of users have never smoked a conventional cigarette\*\*\***

## **Slide 28- Highlights from Current Literature**

- Electronic cigarettes (EC) have emerged as the most prevalent form of nicotine consumption among adolescents and young adults
- Studies have explored risk and harm perception of EC use concluding EC is regarded as a safer alternative to cigarette smoking
- Deleterious effects to pulmonary, cardiovascular and oral structures including, teeth, tissue and alveolar bone
- Oral health perceptions with regard to vaping are **unknown**
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## **Slide 29- US Prevalence in EC usage as of 2018:**

### ***According to data from CDC, FDA, NIH & ALA***

- \*Roughly 10.8 Million Americans use EC (35 million world wide)
- \* More than half are under the age of 34
- \* 6.4 Million under the age of 25
- \* 2.8 Million are 18-24 years old
- \* 3.05 Million are 15-18 years old
- \* 570,000 are 11-14 years old

## **Slide 30- Great Resources**

The Truth Initiative

<https://truthinitiative.org/>

<https://e-cigarettes.surgeongeneral.gov/getthefacts.html>

## **Slide 32- E-Cigarette Use Among Youth and Young Adults**

Published in 2016 as a collaboration between:

- U.S. Department of Health and Human Services
- Centers for Disease Control and Prevention
- National Center for Chronic Disease Prevention
- Health Promotion Office on Smoking and Health

## **Slide 34- Negative Health Effects of Vaping**

What's in the News....

## **Slide 36- CDC Launches Probe In to Surge of Severe Lung Disease Cases Linked to vaping**

## **Slide 37- CDC Statement released 8/17/2019**

CDC is providing consultation to the departments of health in Wisconsin, Illinois, California, Indiana, and Minnesota about a cluster of pulmonary illnesses linked to e-cigarette product use, or “vaping,” primarily among adolescents and young adults. Additional states have alerted CDC to possible (not confirmed) cases and investigations into these cases are ongoing. There is no conclusive evidence that an infectious disease is causing the illnesses. While some cases in each of the states are similar and appear to be linked to e-cigarette product use, more information is needed to determine what is causing the illnesses.

#### Latest Information

- 94 possible cases of severe lung illness associated with vaping were reported in 14 states from June 28, 2019, to August 15, 2019 (this includes [30 cases](#) in Wisconsin).
- The investigation is ongoing and more information will be shared as it is available.

CDC notified U.S. healthcare systems and clinicians about the illnesses and what to watch for via a [Clinician Outreach and Communication Activity \(COCA\) Clinical Action Message](#). For information about a specific state, contact that state's health department.

For information on electronic cigarettes visit: [www.cdc.gov/tobacco/basic\\_information/e-cigarettes/index.htm](http://www.cdc.gov/tobacco/basic_information/e-cigarettes/index.htm)

### **Slide 38- Vaping-linked lung disease cases jump from 94-153 in 5 days, CDC says**

#### **Slide 39- What we know...**

- CDC still investigating
- Most cases suspected to be linked to contaminated THC (tetrahydrocannabinol) oils bought “off the street”
- CDC Statement from 8/21/19- “no specific product has been identified in all cases, nor has any product been conclusively linked to illnesses.”

### **Slide 40- What is lipoid Pneumonia- and can you get in from Vaping?**

#### **Slide 41- What we know about lipoid pneumonia:**

- Two confirmed cases, dozens more suspected
  - Occurs when lipids (fatty acids) enter the lungs
  - Tiny droplets of lipids inhaled via EC vapors
  - Vegetable glycerin from EC liquid found in alveoli
  - Treated with steroids, antibiotics and long-course oxygen supplementation
  - Healing time currently unknown
- (Source: BMJ Case Reports, 2018)

### **Slide 42- Michigan becomes first state to ban flavored EC 9/4/2019**

#### **Slide 43- Michigan ban**

Michigan- 1<sup>st</sup> State to impose a ban on EC (Effective 9/4/19)

Michigan's ban covers:

Retail and online sales of fruity, sweet, mint or menthol flavors

\*San Francisco- 1<sup>st</sup> Major City to impose a ban (Goes into effect 1/1/2020)

### **Slide 44- Exploring Evidence Based Research**

#### **Slide 45- Known Pulmonary Effects**

### **Slide 46- Altered Lung Biology of Healthy Never Smokers Following Acute Inhalation of E-Cigarettes**

Staudt, M. R., Salit, J., Kaner, R. J., Hollmann, C., & Crystal, R. G. (2018). Altered lung biology of healthy never smokers following acute inhalation of E-cigarettes. *Respiratory Research*, 19. <https://doi.org/10.1186/s12931-018-0778-z>

#### **Highlights:**

- Cornell University in 2017
- RCT- small cohort of never-smokers
- Assessed impact of acute exposure to inhaled EC vapors to lung biology
- Baseline biologic samples gathered (chest x-ray, bronchoscopy, lung function, plasm levels)
- Subjects given 10 puffs of EC vapor at baseline
- 70% EC w/ nicotine, 30% w/out nicotine
- Subjects returned 1 wk later for 20 more puffs over 60 minutes

#### **Results:**

- Change in lung biology after 20 puffs of aerosolized nicotine (equiv to 2 cigarettes)
- Biologic disorder of at least 3 **key** lung cell populations (circulating endothelial microparticles, small airway epithelium, alveolar microphages)
- Non-nicotine containing EC **also** disrupted lung cell biology
- Chemical components AND nicotine both implicated in pulmonary cell dysbiosis
- Authors caution health providers to NOT recommend EC as a safe alternative to smoking

### **Slide 49- Association Between Electronic Cigarette Use and Asthma Among High School Students in South Korea**

Cho, J. H., & Paik, S. Y. (2016). Association between electronic cigarette use and asthma among high school students in South Korea. *PLOS ONE*, 11(3), e0151022. <https://doi.org/10.1371/journal.pone.0151022>

#### **Highlights:**

- Nationally representative, stratified sample of Korean HS students (N= 35,904) in 2016
- Tenth Korean Youth Risk Behavior Web-based Survey (KYRBWS)
- Assessed relations between Dr.-diagnosed asthma and EC usage
- Students grades 10-12 with median age of 16.4 yrs

#### **Results:**

- Current EC users showed a statistically significant ( $p < 0.01$ ) prevalence of asthma when compared to non-smoking students.
- Results support data linking vaping and harmful pulmonary effects, especially increased epithelial inflammation in airways.

### **Slide 51- Cardiovascular Effects**

### **Slide 53- Association Between Electronic Cigarette Use and Myocardial Infarction**

Alzahrani, T., Pena, I., Temesgen, N., & Glantz, S. A. (2018). Association between electronic cigarette use and myocardial infarction. *American Journal of Preventive Medicine*, 55(4), 455–461. <https://doi.org/10.1016/j.amepre.2018.05.004>

## Highlights:

- Cross-sectional interview survey
- Subjects 18+ yrs randomly selected
- Data from National Health Interview Survey
  - ~Wave 1- 2014 (N= 36,697)
  - ~Wave 2- 2016 (N=33,028)
- Info from 2 waves combined and evaluated association between vaping, smoking and MI

## Results:

- Daily vaping has statistically significant association with ↑ odds of MI (OR= 1.79, CI=1.20-2.66, p=0.004)
- Current dual users had a OR= 4.62 compared to never users
- Vaping alone puts users at higher risk of MI
- Coupled with smoking, EC user is 4.6 times more likely to have an MI
- Prompts researchers to explore long-term effects of EC use especially as a smoking cessation tool

## Slide 56- Neurological Implications

### Slide 57- Nicotine Addictiveness 101:

- Vaped nicotine is readily absorbed from the lungs into the bloodstream
- Nicotine stimulates the adrenal glands to release the hormone epinephrine (adrenaline)
- Epinephrine stimulates the central nervous system and increases blood pressure, breathing, and heart rate.
- Nicotine activates the brain's reward circuits and increases *dopamine*
- Pleasure caused by nicotine's interaction with the reward circuit motivates some people to use nicotine again and again, causing addiction
- 

**Slide 58-** If you answer **yes** to one or more of these questions, you **may** be addicted to vaping.

- Do you continue to vape even though you want to stop or think it's hurting you in some way?
- Do you feel anxious or irritable when you want to use your vape but can't?
- Do thoughts about vaping interrupt you when you are focused on other activities?
- Do you still vape after getting in trouble with your parents or school for vaping?
- Have you ever tried to stop vaping but couldn't?
- Do you feel like you have lost control over your vaping?

(Source: <https://teen.smokefree.gov/quit-vaping/vaping-addiction-nicotine-withdrawal>)

**Slide 59- FDA investigating 127 reports of seizures, neurological symptoms related to vaping**

### Slide 60- August 2019:

- FDA announces they are looking into a "potential link" between vaping and seizures
- Between 2010 and 2019 FDA received 127 reports of seizure, tremors or other neurological symptoms, occurring after vaping
- 92 new cases since **April 3, 2019**

**Slide 61- FDA Statement-** "The FDA is continuing its scientific investigation to determine if there's a direct relationship between the use of e-cigarettes and a risk of seizure or other neurological symptoms," Dr. Ned Sharpless, acting FDA commissioner.

### **Slide 62- Chemical Exposure**

### **Slide 63- Adolescent Exposure to Toxic Volatile Chemicals from E-Cigarettes**

Rubinstein, M. L., Delucchi, K., Benowitz, N. L., & Ramo, D. E. (2018). Adolescent exposure to toxic volatile organic chemicals from E-cigarettes. *Pediatrics*, 141(4), e20173557.  
<https://doi.org/10.1542/peds.2017-3557>

#### **Highlights:**

- Adolescents aged 13-18 living in San Francisco, CA (N=103)
- Identified volatile organic compounds (VOC) and nicotine levels in saliva and urine of EC only subjects
- Saliva: assessed levels of cotinine (predominant metabolite of nicotine)
- Urine: assessed 5 VOC commonly found in EC liquids
  - benzene, ethylene oxide, acrylonitrile, acrolein, and acrylamide as well as NNAL (**4-(methylnitrosamino)-1-(3-pyridyl)-1-butanol**)

(NNAL- potent carcinogen found only in tobacco and nicotine-containing products)

- First study to evaluate harmful VOC in EC using adolescents
- Findings support need for Public Health Ed on dangers of vaping
- Provides external validity to claims VOC and carcinogens are present in vaping products and put users at risk

#### **Results:**

- EC users had significantly higher ( $p < .001$ ) cotinine levels than controls
- Metabolite excretion of 5 VOCs significantly higher ( $p < .05$ ) for each toxicant
- When compared to controls EC users had:
  - 341% ↑ acrylonitrile**
  - 20% ↑ acrolein
  - 51% ↑ ethylene oxide
  - 30% ↑ acrylamide
  - 20% ↑ crotonaldehyde
- NNAL levels 77% higher in EC users than controls ( $p < .001$ )

### **Slide 67- Explosions**

**Slide 68- Between 2015- 2017, an estimated 2035 EC explosion and burn injuries reported in US hospitals (CI: 95%)**

### **Slide 69- 2019 Explosion Reports**

#### **316 Vape Explosions: What Were the Circumstances?**

- 82 e-cigarette explosions happened during use.
- 92 e-cigarette explosions happened during charging.
- 75 e-cigarette explosions happened during transport, storage or unknown circumstances.
- 67 e-cigarette explosions involved spare batteries for removable battery mods.

**Source:** <https://ecigone.com/featured/e-cigarette-explosions-comprehensive-list/>

## **Slide 70- Components of various vaping products**

## **Slides 71-74- Examples of Explosions**

**\*\*\*Stretch Break\*\*\***

## **Slide 76- Negative Oral Health Effects of Vaping**

## **Slide 77- Association of E-Cigarette Use with Oral Health: A Population-based Cross-sectional questionnaire study**

Huilgol, P., Bhatt, S. P., Biligowda, N., Wright, N. C., & Wells, J. M. (2018). Association of e-cigarette use with oral health: A population-based cross-sectional questionnaire study. *Journal of Public Health*. <https://doi.org/10.1093/pubmed/fdy082>

### **Highlights:**

- US adults age 18+ from a national sample (N= 456,343) 2016 Behavioral Risk Factor Surveillance System (BRFSS) telephone survey.
- Measure associations between poor oral health (OH) and EC usage in large sample of US adults.
- Cross-sectional survey information used to correlate poor OH and EC usage.

### **Results:**

- Study linked poor Oral Health and EC usage.
- Poor OH was defined by the number of permanent teeth removed due to non-traumatic causes
- Independent association of 78% higher odds (AOR=1.78) of poor OH, when reporting daily EC usage.
- EC usage and OH: (Based on total population)
- Daily EC use- N=2,752 (55.5%) reported poor OH
- Intermittent EC use- N=5,639 (56%) reported poor OH
- Statistically significant association between EC usage and poor OH- (AOR= 1.78, 95% CI: 1.39-2.30; p<0.001).
- EC usage has negative impact on OH.
- Increase in OR of poor OH dose-dependent to usage patterns.
- Findings provide basis for further exploration of damage to oral structures cause by EC usage.

## **Slide 80- The Association Between Electronic-cigarette Use and Self-reported Oral Symptoms Including Cracked or Broken Teeth and Tongue and/or Inside Pain Among Adolescents A Cross-sectional Study**

Cho, J. H. (2017). The association between electronic-cigarette use and self-reported oral symptoms including cracked or broken teeth and tongue and/or inside-cheek pain among adolescents: A cross-sectional study. *PLOS ONE*, 12(7), e0180506. <https://doi.org/10.1371/journal.pone.0180506>

### **Highlights:**

- First large-population study to examine association between OH and EC use.
- Assess the relationship of EC use and adverse oral health conditions among Korean adolescents.



- Data from the 2016 Korean Youth Risk Behavior Web-based Survey (KYRBWS) assessed self-reported responses regarding EC usage, intraoral pain, bleeding and broken teeth.
- Middle and high school students (N= 65,528) located in 798 schools in South Korea. Response rates for middle and high school students were 96.9 % and 95.9%, respectively.
- Statistically significant relationship exists between nicotine-containing EC usage and broken/cracked teeth and/or inside-cheek pain when compared to never EC users in the study.
- Odds ratio (OR) of EC users revealed 60% higher likelihood of cracked/broken teeth compared to never EC users.
- Results conclude nicotine found in EC may significantly contribute to broken or cracked teeth.
- **Hypothesis supports that teeth exposed to nicotine experience pulpal inflammatory response that may progress to pulp necrosis and/or tooth breakage.**

### Results:

Gingival pain and bleeding-18.5% (total population)

Daily EC User- 24.2%

Past EC user- 21.8%

Never EC user- 18.2%

(no statistical significance was found between daily, past and never users and gingival pain)

Tongue and/or inside-cheek pain-11% (total population)

Daily EC user- 19.9%

Past EC user 1-29 days- 13.7%

Never EC user- 10.9%

Daily users and never users, (OR= 2.04, 95% CI 1.48-2.81, p=0.028)

\*Odds of tongue and/or inside-cheek pain in daily EC user >50% compared to never users.

Cracked or broken teeth -11.4% (total population)

Daily EC user- 27.3%

Past EC user 1-29 days- 20.2%

Never EC user- 10.8%

Daily users and never users, (OR= 2.87, 95% CI 2.16-3.82, p= 0.003)

**\*Odds of cracked or broken teeth in daily EC user >60% compared to never users.**

### Slide 84- Cariogenic Potential of Sweet Flavors in Electronic-cigarette Liquids

Kim, S. A., Smith, S., Beauchamp, C., Song, Y., Chiang, M., Giuseppetti, A., ... Kim, J. J. (2018). Cariogenic potential of sweet flavors in electronic-cigarette liquids. *PLOS ONE*, 13(9), e0203717. <https://doi.org/10.1371/journal.pone.0203717>

### Highlights:

- Study explored changes in tooth structure (demineralization) and microbial adhesion (biofilm) when exposed to various EC aerosols.
- To examine if EC aerosols can alter interaction between *S. mutans* and tooth structure:
- Extracted human third molars were exposed to EC liquid aerosols and *Streptococcus mutans*.

- *In vitro* analysis to systematically determine carcinogenicity and viscosity of aerosol compared to unflavored controls.  
EC liquid aerosols can:
- Potentially interact with teeth yield effects similar to exposure to sucrose-containing candy or acidic drinks
- Produce viscous aerosols that promote cariogenic bacterial attachment and cause demineralization and caries formation
- EC exposure effects are complex and go beyond respiratory, cardiovascular to include oral health

### Results:

- Viscosity of EC liquid enabled *S. mutans* adherence to enamel pits and fissures
- Extracellular Polymeric Substances (EPS) was increased when *S. mutans* was exposed to EC liquid
- More EPS excreted
- Resulting in rapid biofilm formation
- Increased enamel demineralization 4/5 flavors examined significantly increased biofilm formation (p value) and decrease in tooth hardness (%) when compared to controls:
  - Sucralose (p<0.005), (8.6%)
  - Pineapple (p<0.05), (15.4%)
  - Smoky (p<0.05), (27.4%)
  - Apple (p<0.005), (21.5%)

### Slide 88- E-cigarettes and Flavorings Induce Inflammatory and Pro-senescence Responses in Oral Epithelial Cells and Periodontal Fibroblasts

Sundar, I. K., Javed, F., Romanos, G. E., & Rahman, I. (2016). E-cigarettes and flavorings induce inflammatory and pro-senescence responses in oral epithelial cells and periodontal fibroblasts. *Oncotarget*, 7(47), 77196.

### Highlights:

- 2015: First study to evaluate vasoconstrictive effects of nicotine on gingival blood vessels
- Investigate pathogenesis of EC aerosols and flavorings on oral cells and tissues
- *In vitro* analysis of human periodontal ligament fibroblasts (HPdLFs) and human gingival epithelium progenitors (HGEPp) exposed to various EC vapors (BLU® Classic Tobacco, BLU® Magnificent Menthol) containing either 16mg nicotine, no nicotine and menthol flavoring with and without nicotine

### Results:

- Nicotine content and flavoring showed stat signif (p<0.05) deleterious effects on PDL and gingival epithelium structures.
- Vasoconstrictive properties of nicotine in EC vapors has negative impact of gingival blood flow.
- Platelet adhesiveness, tissue ischemia and microvascular occlusion were also reported.
- Findings **consistent** with damage caused by conventional smoking.

## Slide 92- Influence of E-smoking Liquids on Human Periodontal Ligament Fibroblasts

Willershausen, I., Wolf, T., Weyer, V., Sader, R., Ghanaati, S., & Willershausen, B. (2014). Influence of E-smoking liquids on human periodontal ligament fibroblasts. *Head & face medicine*, 10(1), 39.

### Highlights:

- Six test solutions containing various constituents of EC liquid.
- EC flavorings including lime, hazelnut and menthol.
- Total N=6 test groups plus control.
- In vitro assessment of influence various EC liquids have on cell proliferation and viability of HPdLF
- HPdLF cells incubated up to 96 hrs. in various flavors of liquid, nicotine (20-2mg/ml), propylene glycol and phosphate-buffered saline (PBS) for control.

### Results:

- Over 96 hrs, all HPdLF groups incubated in nicotine, and/or flavored liquid, showed reduced proliferation in cell viability.
- After 24hrs, cells treated in **menthol** flavored liquid experienced statistically significant reduction of proliferation compared to control ( $p < 0.001$ ).
- Adenosine triphosphate (ATP) detection of HPdLF after incubation revealed degenerative characteristics of all cells exposed to nicotine and flavorings.
- Study results indicated menthol flavoring in EC causes **significant** cell damage ( $p < 0.001$ ) to human periodontal ligament fibroblasts.

## Slide 94- Peri-implant Parameters, Tumor Necrosis Factor-Alpha, and Interleukin-1 Beta Levels in Vaping Individuals

Al-Aali, K. A. (2018). Peri-implant parameters, tumor necrosis factor-alpha, and interleukin-1 beta levels in vaping individuals. *Clinical Implant Dentistry and Related Research*. Retrieved from <https://onlinelibrary-wiley.com.ezproxymcp.flo.org/doi/abs/10.1111/cid.12597>

### Highlights:

- Pilot study of Saudi Arabian male adults age 18+ yrs (N=92) w/ 1 or more dental implant for  $\geq 36$  months.
- Subjects divided into vaping (EC user) group-1 (N=47) and never-smokers group-2 (N=45). Mean age=35.8 yrs.
- Compared clinical pocket depths (PD) & radiographic parameters, levels of tumor necrosis factor-alpha (TNF- $\alpha$ ), and interleukin-1 beta (IL-1 $\beta$ ) levels in EC users vs. never smokers.
- Study questionnaire, clinical peri-implant (PI) assessment & radiographic eval of peri-implant bone loss (PIBL) were all evaluated

### Results:

- Harmful inflammatory levels of TNF- $\alpha$  & IL-1 $\beta$ , PIBL & PD  $\geq 4$ mm were stats  $\uparrow$  in vaping pts vs never-smokers.
- Findings **consistent** with negative effects of **tobacco smoking** on oral cavity.
- BOP stat signif  $\downarrow$  values in group-1 ( $p < .01$ ) suggests vasoconstriction w/nicotine expo.
- PIBL and PD  $\geq 4$ mm were stat signif  $\uparrow$  in group-1 vs. group-2 ( $p < .05$ ).

- Mean concentrations of TNF- $\alpha$  ( $p < .001$ ) & IL-1 $\beta$  ( $p < .01$ ) stat signif  $\uparrow$  in group-1 vs. group-2.
- Other significant correlations found in group-1 over group-2:  
TNF- $\alpha$  level and BOP ( $P = .024$ ) and PIBL ( $P = .016$ )  
IL-1 $\beta$  levels and PIBL ( $P = .018$ )
- Radiographic and clinical PI parameters **compromised** in vaping patients

### **Slide 97- Electronic Nicotine Delivery Systems: Oral Health Implications and Oral Cancer Risk**

Sultan, A. S., Jessri, M., & Farah, C. S. (2018). Electronic nicotine delivery systems: Oral health implications and oral cancer risk. *Journal of Oral Pathology & Medicine*.

#### **Highlights:**

- Only study to date assessing vaping and oral cancer
- Small cohort (N=45)
- Stat signif increase of nicotinic stomatitis, hairy tongue, angular cheilitis and xerostomia in EC users
- Concluded nicotine vasoconstriction adversely affects oral mucosa blood flow
- Disruption of oral microbiome MAY put users at risk of oral dysbiosis
- Dysbiosis can theoretically lead to a-typical cellular changes but TOO SOON to tell

### **Slides 99-103- Perception**

#### **Slide 105- Perceived Risk and Benefits of E-cigarette Use Among College Students**

Copeland, A. L., Peltier, M. R., & Waldo, K. (2017). Perceived risks and benefits of e-cigarette use among college students. *Addictive Behaviors*, 71, 31–37.  
<https://doi.org/10.1016/j.addbeh.2017.02.005>

#### **Highlights:**

- First study to assess benefit vs risk on multi item scale.
- Undergrad students from southern US university (N=734) aged 18+.
- Mean age 20.07ys (SD=1.97). 78.1% female, 76.4% Caucasian.
- Identified safety and usefulness perceptions of EC among college students.
- Risk and benefit of E-cig (RABE) 44 item questionnaire assessing beliefs, attitudes and knowledge of EC safety and benefits. RABE used 7 pt Likert scale. 1= totally disagree, 7= totally agree, 4= neither agree or disagree.

#### **Results:**

- College EC users  $\uparrow$ benefit/ + attitude toward EC than non-users.
- More positive the attitudes = more likely to try EC **even in never users**.
- No differences in risk associated with EC among EC users, cig smokers or dual users. College students in current study that use EC found  $\uparrow$  health benefits and  $\uparrow$  likelihood to use EC.
- Significant difference in perceived benefit across smoking group ( $p < 0.001$ ).  
EC users = (m= 4.31; SD = 0.89)  
Dual users = (m= 3.95; SD = 0.94)  
Smokers = (m= 3.82; SD = 0.66)  
Non-smokers = (m= 3.76; SD= 1.0)
- Current trends alarming for EC use among college-aged students. These users perceive benefits to using EC and continue use w/out considering negative health effects.

## Slide 108- College Students' Perceptions of Risk and Addictiveness of E-cigarettes and Cigarettes

Cooper, M., Harrell, M. B., Pérez, A., Delk, J., & Perry, C. L. (2016). Flavorings and perceived harm and addictiveness of e-cigarettes among youth. *Tobacco Regulatory Science*.  
<https://doi.org/info:doi/10.18001/TRS.2.3.7>

### Highlights:

- College students aged 18-26 yrs at 24 Texas colleges N= 5,482
- Explored the harm perception and addictiveness of conventional cigarette and EC use of individual and dual users.

### Results:

- Perceptions of harm and addictiveness was ↓ for ECs (79% & 71%, respectively) than conventional cigs (84% & 86%, respectively) among participants.
- Dual users (9.2%) EC users (8.3%) and smokers (12.2%) perceived both products **less** harmful than non-smokers (70.4%) with stat signif of  $p < 0.001$  for all comparisons.
- Multinomial logistic regression tested the association b/w current cig and EC use and perceived harm of both products.
- Results indicated college students who believe EC ↓ harmful than cigs are ↑ likely to engage in ENDS usage.
- Authors support public health initiatives that clearly define negative effects and addictive properties of nicotine associated with EC usage

## Slide 111- Recognition, Use, and Perceptions of JUUL Among Youth and Young Adults

Willett, J. G., Bennett, M., Hair, E. C., Xiao, H., & Greenberg, M. S. (2018). Recognition-use-and-perceptions-of-JUUL-among-youth-and-young-adults. *Tobacco Control*, 0, 1–2. Retrieved from <https://tobaccocontrol.bmj.com/content>

### Highlights:

- National online survey (N= 1012) convenience sample of people aged 15-24 years conducted by Schroeder Institute at Truth Initiative.
- Examine perception regarding nicotine content and use of JUUL.
- Respondents given images of JUUL and asked to identify device by name and describe usage.

### Results:

- Product recognition of JUUL reported in 25% of all polled.
- Over 80% of JUUL users reported past 30-day use, and suggests JUUL users are regular and not experimenting.
- Ever users of JUUL = 10% and past 30-day use= 8%.
- Respondents age 18-24 more likely to recognize JUUL vs age 15-17 (29% vs. 21%) and report ↑ ever use (12% vs. 7%) ( $p < 0.01$ ).
- Male vs female comparison: more likely to recognize JUUL (30% vs. 21%) ever use (13% vs. 7%) and past 30-day use (10% vs. 6%) ( $p < 0.05$ ).
- More financially stable had statistically significant level of recognition of JUUL (34% vs. other) and past 30-day use of (11% ) ( $p < 0.01$ ).

- Only 37% of JUUL users were aware that nicotine is present in **all** JUUL products.
- (Meaning 63% of people using this did NOT know it **ALWAYS** contains nicotine!)
- Over a third of respondents (34%) recognized JUUL by name suggesting terminology for tobacco surveillance may underestimate JUUL usage.
- Users distinguish “JUULing” from vaping
- Study shows a need to ↑ awareness about addictive properties of JUUL, especially with youth/young adults.

### **Slide 116- Cessation Strategies “Why cessation matters”**

[https://www.cdc.gov/tobacco/quit\\_smoking/](https://www.cdc.gov/tobacco/quit_smoking/)

### **Slide 117- The DHY Process of Care**

#### **Slide 118- Assessment Findings**

- I. Chief Complaint
- II. Risk Factors
- III. Patient’s Overall Health Status
- IV. Oral Healthcare Knowledge Level of the Patient
- V. The Patient’s Self-Care Ability

### **Slide 119- Assessment Findings**

#### ***II. Risk Factors***

- A. Risk factors for Infections or poor response to periodontal therapy
- B. Periodontal disease as a risk factor for systemic conditions
- C. Risk factors for dental caries
- D. Risk factors for oral cancer
- E. Tobacco (nicotine) usage

### **Slide 120- Risk factors**

- Presence of risk factors ↑ the patient’s potential for ↓ oral health outcomes
- Anticipatory guidance through patient education is an essential component of care planning, particularly if patient has **one or more** risk factors (Wilkins, 2017)

### **Slide 122- 5 “A’s for Effort” in Vaping Cessation**

- **Ask**
- Obtain health history
- Present questions carefully
- Gain patient’s confidence
- **Advise**
- Advise every patient on nicotine use
- Praise “never” or “former” users
- Employ a “stop now” approach
- **Assess**

- Ask patient if they are ready to quit
- If not ready, utilize the 5 R's
  - Relevance
  - Risks
  - Rewards
  - Roadblocks
  - Repetition
  -

### Implementation of the 5 A's (cont)

- **Assist**
  - Establish a quit plan (within 2 weeks)
  - Have patient request support from family and friends
  - Provide practical counseling
  - Discuss Pharmacotherapy
  - Provide Educational Information
  - Provide patient with various resources
- **Arrange**
  - Follow-up
  - Contact patient before quit date
  - Assures patient of your genuine interest in their success

### Slide 124- Assessment Form

**TOBACCO USE ASSESSMENT FORM**

Name: \_\_\_\_\_ Date: \_\_\_\_\_

1. Do you use tobacco in any form?  Yes  No

1A. If no, have you ever used tobacco in the past?  Yes  No

How long did you use tobacco? Years \_\_\_\_\_ Months \_\_\_\_\_

How long ago did you stop? Years \_\_\_\_\_ Months \_\_\_\_\_

*If you are not currently a tobacco user, no other questions should be answered. Thank you for completing this form.*

*Question 2-10 are for current tobacco users only.*

2. If you smoke, what type (check) How many? (Number)

Cigarettes Cigarettes per day \_\_\_\_\_

Cigars Cigars per day \_\_\_\_\_

Pipes Bowls per day \_\_\_\_\_

3. If you chew/use snuff, what type? How much?

Snuff Days a can lasts \_\_\_\_\_

Chewing Pouches per week \_\_\_\_\_

Other (describe) Amount \_\_\_\_\_ per \_\_\_\_\_

3A. How long do you keep a chew in your mouth? \_\_\_\_\_ minutes

4. How many days of the week do you first use tobacco? 7 6 5 4 3 2 1

5. How soon after you wake do you first use tobacco?

Within 30 minutes? \_\_\_\_\_ More than 30 minutes? \_\_\_\_\_

6. Does the person closest to you use tobacco?  Yes  No

7. How interested are you in stopping your use of tobacco?

not at all  a little  somewhat  Yes  very much

8. Have you ever tried to stop using tobacco before?  Yes  No

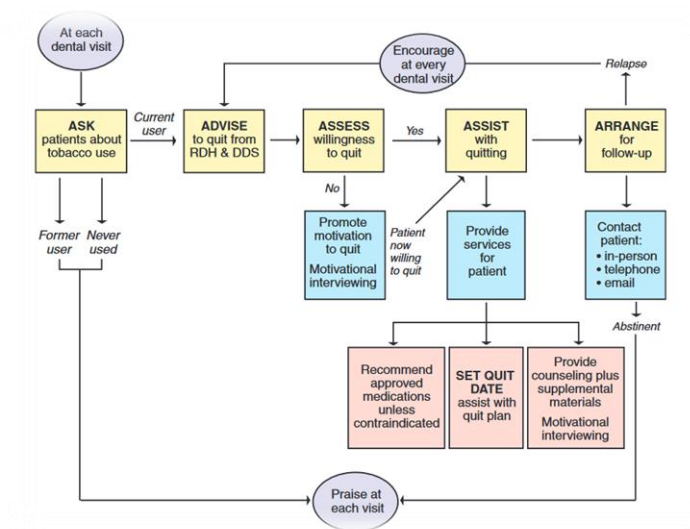
9. Have you discussed stopping with your physician?  Yes  No

10. If you decided to stop using tobacco completely during the next two weeks, how confident are you that you would succeed?

not at all  a little  somewhat  very confident

FIGURE 34-3 Tobacco Use Assessment Form. (Reprinted from Mecklenburg, RE, Greenspan D, Kleinman DV, et al. *Tobacco Effects in the Mouth: A National Cancer Institute and National Institute of Dental Research Guide for Health Professionals*. Washington, DC: U.S. Department of Health and Human Services, National Institutes of Health; 2007. NIH Publication No. 07-3330.)

## Slide 126- Cessation Flowchart



## Slide 127- Factors to Teach the Patient



### Factors To Teach The Patient

- ▷ The most effective method to stop using tobacco is never to start.
- ▷ How to perform a regular self-examination of the oral cavity.
- ▷ Pregnant women who use tobacco products can harm the developing fetus and the newborn infant.
- ▷ Young children may experiment with or use tobacco products. Parents can be educated so they are prepared to provide guidance.
- ▷ All forms of social tobacco use can lead to addiction.
- ▷ Nonsmokers who breathe ETS can incur the same serious health problems as smokers; children are especially susceptible.
- ▷ Smokeless tobacco use is *not* a safe alternative to smoking.
- ▷ Oral health team members can help patients become tobacco free.
- ▷ Learn about local or state tobacco legislation and public health policy to make informed choices related to a tobacco smoke-free society.

## Slide 128- Treating Tobacco Use Dependence

[https://dphhs.mt.gov/Portals/85/publichealth/documents/Tobacco/Publications/DentalToolkit\\_1.pdf](https://dphhs.mt.gov/Portals/85/publichealth/documents/Tobacco/Publications/DentalToolkit_1.pdf)

## Slide 129- EC quit program for teens and young adults

“DITCHJUUL” TO 88709



## Slide 130- Sources for tobacco cessation patient educational materials

NAME OF SOURCE	QUIT LINES	LINKS
American Cancer Society	1-877—yes quit 1-877—937-7848	<a href="http://www.yesquit.com">www.yesquit.com</a> <a href="http://www.cancer.org">www.cancer.org</a>
American Lung Association		<a href="http://www.lungusa.org">www.lungusa.org</a>
National Cancer Institute		<a href="http://www.cancer.gov">www.cancer.gov</a>
CDC Tobacco Information and Prevention Tips		<a href="http://www.cdc.gov/tobacco/">www.cdc.gov/tobacco/</a>
Nicotine Anonymous		<a href="http://www.nicotine-anonymous.org">www.nicotine-anonymous.org</a>
QuitNet		<a href="http://www.quitnet.com">www.quitnet.com</a>
National Alliance for Tobacco Cessation		<a href="http://www.becomeanex.org">www.becomeanex.org</a>
You Can Quit Smoking—Agency for Healthcare Research and Quality		<a href="http://www.ahrq.gov/consumer/tobacco">www.ahrq.gov/consumer/tobacco</a>
Smokefree.gov	National Quit Line 1-800—Quit-Now (1-800-784-8669)	<a href="http://www.smokefree.gov">www.smokefree.gov</a>
American Dental Hygienists' Association (Ask. Advise. Refer)		<a href="http://www.adha.org">www.adha.org</a>

## Slides 131-134- Resources from this Presentation

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**Other weblinks:**

<https://www.cdc.gov/tobacco/campaign/tips/quit>

[https://www.cdc.gov/tobacco/basic\\_information/](https://www.cdc.gov/tobacco/basic_information/)

<https://e-cigarettes.surgeongeneral.gov/getthefacts.html>

<https://ecigone.com/featured/e-cigarette-explosions-comprehensive-list/>

<https://teens.drugabuse.gov/blog/post/why-nicotine-so-addictive>

<https://teen.smokefree.gov/quit-vaping>

<https://truthinitiative.org/>

<https://www.webmd.com/smoking-cessation/news/20190131/what-works-to-help-teens-quit-vaping#1>

<https://teen.smokefree.gov/quit-vaping/vaping-addiction-nicotine-withdrawal>

[https://dphhs.mt.gov/Portals/85/publichealth/documents/Tobacco/Publications/DentalToolkit\\_1.pdf](https://dphhs.mt.gov/Portals/85/publichealth/documents/Tobacco/Publications/DentalToolkit_1.pdf)

<https://www.dailymail.co.uk/news/article-4125240/Idaho-man-loses-teeth-vape-explodes-face.html>

<https://globalnews.ca/news/2694377/california-man-loses-eye-in-e-cigarette-explosion/>

<https://nypost.com/2019/02/05/texas-man-killed-by-exploding-vape-pen/>

**Slide 138- Thank you!!!**

