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# E-cigarettes and vaping: Educational strategies for the dental professional

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# E-cigarettes and vaping: Educational strategies for the dental professional

## Abstract

Nicotine vaporizers and electronic cigarettes (e-cigarettes) continue to be a popular trend in the adult and adolescent population. Besides causing harm to a person's lungs, vaping can have negative effects on the oral cavity, such as stomatitis and ulcerations in the mouth. Tobacco-containing products have been associated with both immediate and long-term adverse oral and systemic effects.<sup>1</sup> Dental professionals may feel uncomfortable discussing the ill effects of vaping due to a lack of knowledge regarding the different types of products. Collaboration between medical and dental professionals will assist in providing a consistent and valuable educational message.

## Educational objectives

At the conclusion of this educational activity, participants will be able to:

1. Discuss the history of e-cigarettes
2. Identify the many contents in e-liquid
3. Describe the vast legislative changes in vaping within the last several years
4. List the negative effects of vaping on the human body
5. Utilize the educational flowchart to educate patients about vaping



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## Introduction

With each year that passes, new trends arise with different age groups. Electronic cigarette (e-cigarette) use is increasing exponentially in the United States, especially among adolescents and young adults.<sup>2-5</sup> Approximately 20% of adolescents and 8% of adults between the ages of 18 and 24 currently use e-cigarettes in the US.<sup>2,4,6</sup> Use of e-cigarettes among adolescents (ages 10–14) and high school students (ages 14–18) is higher than in the adult population. According to a 2017 US Health and Human Services report, a non-linear increase from 1.5% to 11.3% for current use of e-cigarettes among high school students occurred between 2011 and 2017.<sup>5</sup> The 2018 National Youth Tobacco Survey (NYTS) report recently stated that 3.6 million US adolescents were currently using e-cigarettes, and e-cigarette use has increased exponentially.<sup>5,6</sup> In 2018, increases in 10th and 12th grade students using e-cigarettes were the largest recorded for any substance during the last 44 years.<sup>7</sup> More adolescents and young adults were apt to try e-cigarettes and report using these products during a 30-day period.<sup>5</sup>

Vaping was once rumored to be a healthy alternative to traditional smoking.<sup>2</sup> Although that has been shown to be false, smokers with lung disease may consider e-cigarettes as a tool to help them quit smoking or improve respiratory symptoms.<sup>2</sup> Studies funded by cigarette companies have found there are very few adverse lung health outcomes in smokers who transition to e-cigarettes.<sup>7</sup> In the past, smoking cessation strategies have included e-cigarettes, but more medical communities and health authorities are discovering a link between vaping and asthma.<sup>2</sup> Vaping is now a multibillion-dollar industry that appeals to current smokers, former smokers, and young people who have never smoked. E-cigarettes reached the market without either extensive preclinical toxicology testing or long-term safety trials that would be required of conventional therapeutics or medical devices.<sup>7</sup> Some of the conclusions referring to the safety of e-cigarettes have been controversial and not well-defined. Many ill effects are very similar to those of regular cigarettes.

The ill effects may not be currently evident but will be more visible in the future as the user grows older.<sup>7</sup>

## History of e-cigarettes

The concept of e-cigarettes has been around for a while. In 1930, Joseph Robinson received a patent for an e-cigarette, but it never developed into an actual commercialized product. Herbert A. Gilbert from Beaver Falls, Pennsylvania, patented the first smokeless, nontobacco cigarette device in 1967, but it was not commercialized at that time.<sup>8</sup> In the late 1970s, Phil Ray produced a nicotine delivery system, but it was not successful. In 2003, Hon Lik, a Chinese pharmacist, in collaboration with the company Dragon Holding, was credited with creating the first modern e-cigarette. They were called Ruyan, or “smoke-like,” and began being sold and distributed in China.<sup>9</sup> This product was developed by Lik because his father died of lung cancer, and he wanted to offer an alternative to cigarettes. After the creation of the modern e-cigarette, its use and activities such as vaping became very popular in Asia and Europe around 2006. Finally, in 2007, e-cigarettes were introduced into the US market.<sup>5,10</sup> Most people begin using e-cigarettes because they want to quit smoking, they are curious about the product, or friends and family currently use them due to cost, ease of availability, and convenience.<sup>5</sup> The evolution of e-cigarettes has moved through the following generational steps:

- First generation of disposable e-cigarettes (one-time-only use: “cigalikes”)
- Second generation of e-cigarettes with prefilled or refillable cartridge (attached to a battery pen)
- Third generation of tanks or mods that are refillable and rechargeable (customizable substances with sub-ohm tanks that release more nicotine)
- Fourth generation of pod-mods (prefilled or refillable with many shapes, sizes, and colors; common brands are Juul and Suorin; use nicotine salts, which have a lower pH that freebases nicotine; and have higher levels of nicotine, which are released with less throat irritation than standard freebase nicotine)<sup>11</sup>

When e-cigarettes began to be sold in the US in 2007, they gave people a false sense of security. Traditional smoking is directly related to an increased chance of developing multiple types of oral effects such as bad breath, loss of taste and smell, mouth sores, failure of dental implants, periodontal disease, and many types of oral cancer.<sup>1</sup> In 2007, marketing from the manufacturers of e-cigarettes stated that their products were a healthier alternative and there was no chance of developing cancer from using them. People were amazed and excited because finally there was a “healthier way to smoke.” Vapors from e-cigarettes contain nine to 450 times lower toxic substances than smoke inhalation from a regular cigarette.<sup>12</sup>

## Regulations for e-cigarettes and similar products

E-cigarettes gained popularity as an alternative to cigarettes. Research has shown that flavored tobacco products are often “starter” products among children and adolescents. Adding flavor entices users but, unfortunately, there was no regulation preventing the use of flavors in e-cigarettes, hookahs, cigars, or smokeless tobacco products.<sup>13</sup> Recently, more regulations have been introduced. In 2016, the Food and Drug Administration (FDA) finalized a rule that expanded regulations to cover all tobacco-containing products, including electronic nicotine delivery systems (ENDS), which meet the definition of a tobacco product.<sup>14</sup> Products that are used for therapeutic purposes, or to help people quit tobacco use, are regulated by the FDA’s Center for Drug Evaluation and Research (CDER). Beginning in 2018, all covered tobacco products must have the required addictiveness label on packaging and in advertisements.<sup>14</sup> The US president signed more legislation in 2019 to amend the Federal Food, Drug, and Cosmetic Act to increase the federal minimum age for the sale of tobacco products from 18 to 21.<sup>14</sup> It is now illegal for stores to sell any tobacco product, including cigarettes, cigars, and e-cigarettes, to anyone under 21 years of age. In January 2020, the FDA issued an enforcement policy on unauthorized flavored cartridge-based e-cigarette products, including fruit and mint flavors that appeal to children.<sup>14</sup>



More than 80% of current youth users prefer e-cigarettes with flavoring such as mint, fruit, and candy.<sup>14,15</sup> Different flavors often make the product more interesting for young users. E-cigarettes produce a vapor or aerosol from a nicotine-containing liquid as well as a heating element. Once inhaled, the vapor goes into the mouth and lungs and absorbs into the bloodstream, and the remaining aerosol is exhaled. These products come in many shapes and sizes. The slang terms for e-cigarettes are Juul (flash drive shape and very small), e-vaporizer, e-cigs, vape pens, dab pens, dab rings, tanks, mods, pod-mods, vapes, e-pipes, electronic nicotine delivery system (ENDS), and e-hookahs.<sup>5,11,14</sup> Juul is one of the most popular pod delivery systems and has a large share of e-cigarette sales in the US (**figure 1**). The Juul resembles



**FIGURE 1.** Example of the Juul vaping device<sup>14</sup>

a USB memory stick with pods that are exchangeable and filled with flavored e-liquids. Juul has a higher concentration of nicotine (59 mg/mL) than traditional e-liquids (6-18 mg/mL).<sup>7,16</sup>

E-cigarettes have more than 100 available flavor choices and this may encourage young people to start using these products. This population group may view many messages on social media that encourage use due to the lower content of nicotine than found in regular cigarettes. The American Academy of Pediatrics (AAP) has called for swift intervention by the federal government to restrict the sale and marketing of e-cigarettes to young people in their policy statement, "E-cigarettes and similar devices," published in 2019.<sup>17</sup> In June 2022, the Food and Drug Administration ordered all Juul products to be removed from United States markets and this will

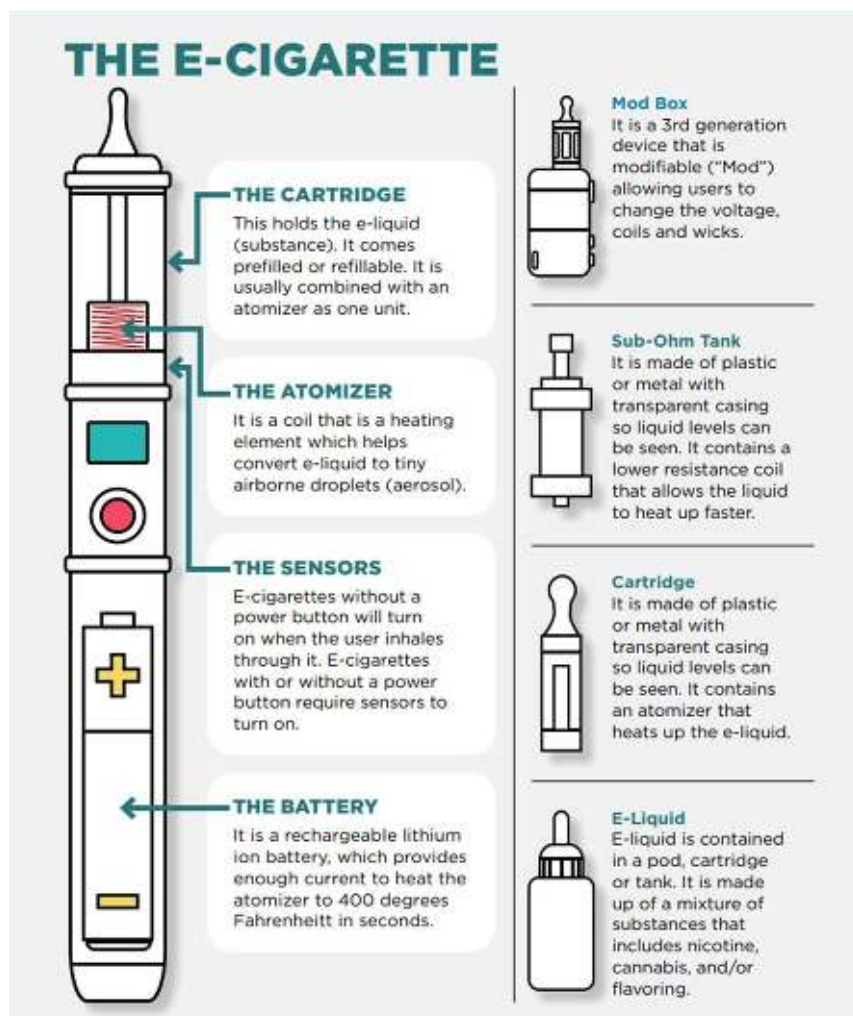
change the landscape of vaping for some teens and young adults.

### Contents of e-liquid

E-cigarettes use a metal-resistant coil to heat and create an aerosol mixture of vegetable glycerin, nicotine, and flavoring such as menthol or fruit. E-liquids are conducted from a tank to the coil by a cotton, silica, or ceramic wick system. This is lit by pushing the button and creating air flow through the device (**figure 2**). These devices or the operator can control nicotine content, nicotine concentration, and how the e-liquid is vaped.<sup>7</sup>

The FDA does not have standards or reviews of any ingredients for e-cigarettes. They are aware of the many toxic substances that are placed in e-liquid. Here is a list of the toxins that are found in e-cigarettes:

- **Nicotine:** highly addictive and negatively affects adolescent brain development
- **Propylene glycol:** common additive in food, also used in making antifreeze, paint solvent, and artificial smoke in fog machines
- **Carcinogens:** cancer-causing agents that include acetaldehyde and formaldehyde and can be absorbed in the lungs
- **Acrolein:** herbicide; causes irreversible lung damage and irritation to the respiratory tract
- **Diacytyl:** linked to a lung disease called bronchiolitis obliterans, or "popcorn lung" (named because of its appearance on chest x-rays and its association to popcorn factory workers)
- **Diethylene glycol:** linked to a toxic substance found in antifreeze and linked to lung disease



**FIGURE 2.** Anatomy of an e-cigarette<sup>11</sup>

- **Heavy metals:** including tin, nickel, and lead
- **Cadmium:** a toxic metal linked to breathing problems and disease
- **Benzene:** a volatile organic compound that is found in car exhaust and can irritate the lungs
- **Vegetable glycerin**

In 2019, hundreds of cases of acute respiratory illness associated with e-cigarette use were reported in the US, which spurred the Centers for Disease Control and Prevention (CDC) to perform an investigation.<sup>18-20</sup> The patients who had computed tomography imaging had ground glass opacities in both lungs, which may have been caused by the ingredients in the vaping liquid.<sup>8,21</sup> These studies must continue so that consumers, health-care providers, and health-care facilities can be informed about the possible negative effects of vaping liquid.

**Negative effects on the human body**

Several factors control the effects of e-cigarettes on health:

1. External factors such as climate conditions, airflow, particle size, and number of people who are vaping in close proximity to one another;
2. Characteristics of the e-cigarette, such as type and age of the vaping instrument, voltage of battery, puff length, and time frame between puffs; and
3. Demographics such as age, gender, experience, and health status of the person using e-cigarettes.<sup>5,22,23</sup>

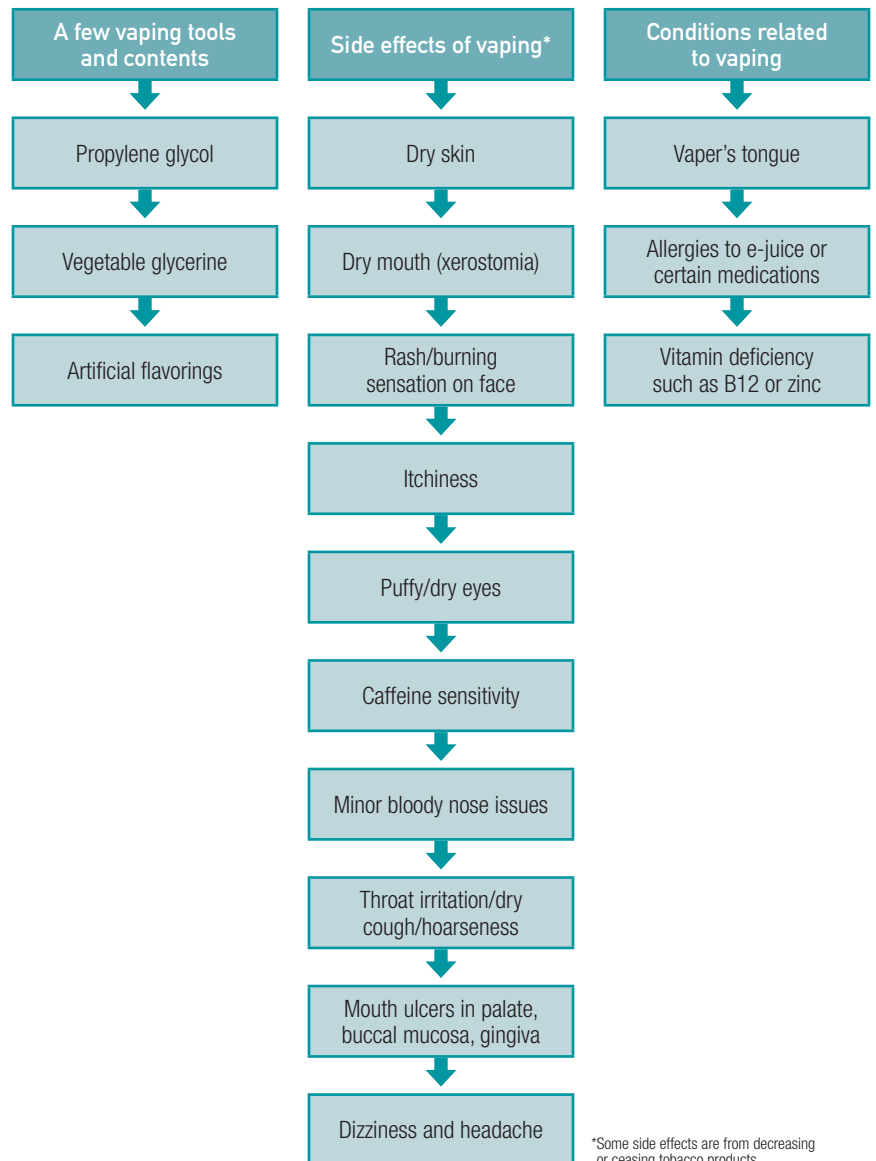
**Systemic negative effects:** Extensive research has shown the adverse effects of nicotine-containing products on developing brain tissue, and nicotine exposure during adolescence is likely to adversely affect cognitive function and development. Use of nicotine-containing products can affect physical and mental health. Young users can begin with e-cigarettes and may migrate toward regular cigarettes, and this can build the addiction even further.<sup>13,24</sup> Pregnant mothers who vape are placing their babies at high risk for harmful fetal brain development.<sup>5,25</sup>

Chronic obstructive pulmonary disease (COPD) is one of the leading causes of morbidity and mortality in the US and

globally.<sup>2,26,27</sup> Research does not completely explain if there is a direct correlation between COPD and e-cigarettes. However, exposure to aerosols triggers an inflammatory response that is similar to that of cigarette smokers. This response does create a higher prevalence of chronic respiratory illness such as asthma and COPD.<sup>2,14</sup> The Behavior Risk Factor Surveillance Survey (BRFSS) found an association between e-cigarette use and asthma or COPD, and this was a greater association than in patients who were nonsmokers.<sup>7,28</sup> E-cigarette use can produce chronic cough, phlegm, or chronic bronchitis.<sup>7</sup> Patients who have

preexisting conditions with airway disease are at a higher risk for acute airway obstruction with e-cigarette exposure.<sup>7</sup> According to research performed by the Center for Tobacco Research and Educational Center at University of California San Francisco in 2018, smoking e-cigarettes daily can double the risk of heart attack. This study brought to light the correlation between e-cigarettes and cardiovascular conditions.<sup>5,29</sup>

There is a threat of toxic reactions if a vaping liquid spill occurs. The free-flowing liquid can cause adverse health effects such as seizures, anoxic brain injury, and/or lactic acidosis due to high nicotine content in the cartridges.<sup>5,30</sup>



\*Some side effects are from decreasing or ceasing tobacco products

**FIGURE 3:** The dental professional's educational tool<sup>35-39</sup>

The following information promotes safety to users of these products in case they decide to continue using e-cigarettes.

1. Consider using vapes with safety features (firing lock buttons, vent holes, and ways to prevent overcharging the device).
2. Keep the vaping device covered so it does not contact other metallic objects in pockets.
3. Do not charge the vaping device with a tablet or phone charger. Chargers that are specific for these devices should always be used.
4. Do not charge the vaping device overnight or leave it to charge on its own.
5. Always replace the batteries if they become wet or damaged in any way. Contact the manufacturer with questions regarding replacement or ways to remedy the situation.<sup>14</sup>

Vapers and smokers are at a higher risk of critical illness and complications from coronavirus infection due to lung tissue inflammation and increase in the incidence of pulmonary infection.<sup>31</sup>

**Negative effects to the oral cavity, nose, throat, and airway:** In addition to pulmonary damage, vaping can negatively affect the epithelial-rich oral cavity as well as the nose, throat, and airway.<sup>7,32</sup> Epithelial cells protect the body and can very quickly shed and regenerate to help keep a person healthy. An experiment performed in 2015 tested the effects of vapor smoke on healthy and cancerous cells. The research found vapor, both with and without nicotine, is cytotoxic (deadly to cells) to epithelial cell linings and is a DNA strand break-inducing agent.<sup>33</sup> This experiment found that vaping is essentially toxic to the type of cells that line the oral cavity. People who vape multiple times a day expose the cells in their mouth to toxic substances each time they use the product. That could cause mutations to form in the cells, which could lead to oral cancer. Each cell that is alive in the body needs to have DNA in it. If vaping has an agent that breaks DNA strands in a cell, the cell will die. Again, if a person vapes multiple times a day, it will be difficult for the body to keep producing cells to replace the broken ones, which results in ulcerations forming in the patient's mouth.

Unfortunately, health-care professionals still do not know the long-term effects that patients will experience if they vape. Some types of e-cigarettes are relatively new devices; thus, no long-term evidence related to oral and systemic health effects exists.<sup>34</sup> Only time will tell the consequences of a patient's decision to vape.

a standard recare appointment or new-patient visit. These can be laminated and used as a chairside aid to provide comprehensive information to patients, demonstrate negative effects of vaping, and provide strategies to recognize that vaping is not a healthy alternative to smoking cigarettes with standard tobacco.

**1. Vaper's tongue.** Taste ailment that can occur when using the same vaping flavor too long or recently switching from smoking. Can cause dehydration and/or fatigue, xerostomia, and damage to taste buds. Tips to avoid vaper's tongue are hydration, cessation of smoking, switching or resetting flavors, nasal irrigation with salt water, improved oral hygiene, and taking a vaping break.

**2. Allergies to e-juice or certain medications.** Patients who are allergic to propylene glycol, vegetable glycerine, or artificial flavorings, or are taking the following medications: thyroid drugs, captopril (ACE inhibitor), griseofulvin (antifungal), lithium (manic depression), penicillamine (to remove excessive copper), procarbazine (cancer drug), rifampin (bacteria fighter used in TB cases), or some cancer drugs, could have ill effects in combination with vaping products.

**3. Vitamin deficiency.** Being deficient in, for examples, B12 (found in meat, fish, and dairy products) or zinc (found in red meat, poultry, oysters, fortified cereals, whole grains, beans, and nuts).

**FIGURE 4:** Conditions related to vaping<sup>35-39</sup>

### The role of the dental professional

Despite the amount of evidence that researchers have uncovered about vaping, the number of people who try it will continue to rise. On many occasions, the dental hygienist is the first health-care provider to treat the patient or client in a dental practice. The ability to educate is solely dependent upon the information that is available to the dental professional. Most dental practices are seeing an increase in the trend of vaping; however, some professionals may not feel comfortable broaching the subject with their patients. **Figures 3 and 4** are tools that can be utilized easily and efficiently in

Another strategy that will assist dental professionals in the management of oral health with patients who vape is incorporating vaping questions into the medical history. Every patient who vapes must have instructions that are informative, yet nonjudgmental. Since vaping patients are more prone to xerostomia, oral candidiasis, gingival bleeding, ulcers, pain, and caries, as well as increased plaque and calculus buildup, this is a top priority along with discussing effective oral health-care strategies. Communication strategies may include informing patients about the negative impacts on oral health. Other tobacco cessation efforts can be discussed, such as



use of non-nicotine-containing liquids to decrease exposure to nicotine. It is critical for the dental professional to initiate a discussion free of judgmental language and nonverbal actions.<sup>31</sup> An effective and thorough oral cancer screening is imperative, and any changes in oral health should be documented and information provided to the patient. Collaboration within the dental and medical teams is important due to increased breathing difficulty and proneness to chronic lung conditions. Patients who vape must be screened for any occlusal wear, recession, mobility, and bruxism because these conditions, along with broken teeth, can occur more frequently.<sup>31</sup>

Dental professionals may want to consider some communication strategies that can assist patients with understanding the negative effects of vaping. Showing patients the changes in their own hard and soft tissues is a positive way to reinforce the need to quit vaping.

## Conclusion

Since there is limited information that dental professionals can use regarding the ill effects of vaping, more studies, literature, and constant improvement in regulations are imperative. The FDA should conduct further research about the contents of e-liquid and how they can affect not only the oral cavity but the entire body. These conversations must be initiated by dental professionals, and collaboration with medical groups will be beneficial. Bridging the gap between the dental and medical professions will assist in better health practices by our mutual patients.

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## QUESTIONS

1. Which statement is false?
  - A. It is critical to collaborate with other medical professionals when discussing treatment planning options for patients who vape.
  - B. Patients who vape have a decrease in stomatitis and other oral ulcerations.
  - C. There is a higher rate of vaping within the adolescent population than in the adult population.
  - D. Vaping is a multibillion-dollar industry.
2. Approximately what percentage of adolescents uses e-cigarettes in the United States?
  - A. 10%
  - B. 20%
  - C. 30%
  - D. 40%
3. Smokers with lung disease may consider e-cigarettes as a tool to help them quit smoking or improve respiratory symptoms. E-cigarettes were established without extensive testing and clinical trials.
  - A. Both statements are true.
  - B. First statement is true; second statement is false.
  - C. First statement is false; second statement is true.
  - D. Both statements are false.
4. In what year did Joseph Robinson receive a patent for an e-cigarette, but it never developed into an actual commercialized product?
  - A. 1833
  - B. 1900
  - C. 1923
  - D. 1955
5. In 2003, this Chinese pharmacist, along with the company Dragon Holding, were credited with creating the first “modern” e-cigarette.
  - A. Jackie Chan
  - B. Robert Meadows
  - C. Joseph Robinson
  - D. Hon Lik
6. An example of a first-generation vaping product is:
  - A. Disposable e-cigarettes (one-time-only use: “cigalikes”)
  - B. Prefilled or refillable cartridge (attached to a battery pen)
  - C. Tanks or mods that are refillable and rechargeable (customizable substances with sub-ohm tanks that release more nicotine)
  - D. Pod-mods (prefilled or refillable with many shapes, sizes, and colors)
7. An example of a fourth-generation vaping product is:
  - A. Disposable e-cigarettes (one-time-only use: “cigalikes”)
  - B. Prefilled or refillable cartridge (attached to a battery pen)
  - C. Tanks or mods that are refillable and rechargeable (customizable substances with sub-ohm tanks that release more nicotine)
  - D. Pod-mods (prefilled or refillable with many shapes, sizes, and colors)
8. What year did the Food and Drug Administration finalize a rule that expanded regulations to cover all tobacco-containing products, including electronic nicotine delivery systems (ENDS), that meet the definition of a tobacco product?
  - A. 1980
  - B. 1999
  - C. 2016
  - D. 2020
9. Products that are used for therapeutic purposes, or to help people quit tobacco use, are regulated by the:
  - A. FDA’s Center for Drug Evaluation and Research
  - B. Centers for Disease Control and Prevention
  - C. American Dental Association
  - D. Canadian Dental Hygienists’ Association
10. What year was the age to purchase tobacco products raised from 18 to 21?
  - A. 1958
  - B. 1979
  - C. 1983
  - D. 2019
11. Youth who vape prefer what flavors of e-liquid?
  - A. Tar, fruit, and meat
  - B. Mint, fruit, and candy
  - C. Sassafras, candy, and horehound
  - D. Mint, musk, and fennel
12. Which term below is not considered a slang term for e-cigarettes?
  - A. Juul
  - B. Dab rings
  - C. Tanks
  - D. All are considered slang terms for e-cigarettes
13. What is the primary reason the Juul brand is so popular among vapers?
  - A. It is very large.
  - B. It only has mint flavoring.
  - C. It has a higher level of nicotine.
  - D. None of the above
14. What professional group has called for swift intervention by the federal government to restrict the sale and marketing of e-cigarettes to young people in their policy statement, “E-cigarettes and similar devices”?
  - A. The American Academy of Pediatrics
  - B. The American Psychological Association
  - C. The Centers for Disease Control and Prevention
  - D. All of the above
15. What type of wick system is used in an e-cigarette?
  - A. Ceramic, porcelain, or amalgam
  - B. Silica, metal mesh, or plastic
  - C. Cotton, silica, or ceramic
  - D. Rubber, aluminum, or cadmium



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## QUESTIONS

16. What type of toxin is used in vaping products that is a common additive in food, but is also used in making antifreeze, paint solvent, and artificial smoke in fog machines?
- Paint thinner
  - Diacetyl
  - Propylene glycol
  - Nicotine
17. What type of toxin used in vaping products is an herbicide and causes irreversible lung damage and irritation to the respiratory tract?
- Acrolein
  - Diacetyl
  - Propylene glycol
  - Nicotine
18. Vapers who had CT imaging showed prevalence in what type of lesions in the lungs?
- Multifocal radiolucencies
  - Ground glass opacities
  - Multilocular radiolucencies
  - None of the above
19. What factor does not affect health with use of e-cigarettes?
- Climate conditions
  - Age
  - Health status
  - Color of vaping liquid
20. In adolescents, vaping can affect:
- Brain tissue and cognitive development
  - Cognitive development and hair color
  - Brain tissue and brain elasticity
  - Height and weight
21. Which is one of the leading causes of morbidity and mortality, both in the US and globally?
- Food allergies
  - Chronic obstructive pulmonary disease
  - Type of vape pen used
  - None of the above
22. Which of the following found an association between e-cigarette use and asthma or COPD in a greater association than in patients who were nonsmokers?
- ASTDD
  - NIH
  - BRFSS
  - WHO
23. Vapor, both with and without nicotine, is \_\_\_ to epithelial cell linings and is a DNA strand break-inducing agent.
- Introverted
  - Cytotoxic
  - Elastic
  - Hydrocaustic
24. People who vape have a difficult time healing due to the damage caused in the oral cavity because \_\_\_ does not have time to repair, causing continual damage to cells.
- Pseudomembrane
  - PSR
  - DNA
  - ASA
25. All are possible reactions if you spill vaping liquid except:
- Seizures
  - Acne
  - Lactic acidosis
  - Anoxic brain injury
26. When charging a vaping device, you should avoid placing what type of product in your pocket?
- Anything plastic
  - Anything liquid
  - Anything metal
  - None of the above
27. A vaping device should be charged overnight to ensure it has a good battery life.
- True
  - False
  - Neither true nor false
  - Battery life lasts forever on vaping devices.
28. People who vape are more prone to \_\_\_ infection.
- COVID-19
  - SARS
  - Influenza B
  - TB
29. All of the listed side effects are relevant to vaping except:
- Xerostomia
  - Hoarseness
  - Facial hair growth
  - Burning sensation on face
30. What is the first thing that dental hygienists should do when treating patients who vape?
- Educate on risks of oral cancer.
  - Perform a thorough oral cancer evaluation.
  - Check the medical and dental histories and evaluate vaping questions.
  - Test the patient for vitamin deficiency.

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ANSWER SHEET

## E-cigarettes and vaping: Educational strategies for the dental professional

NAME: \_\_\_\_\_ TITLE: \_\_\_\_\_ SPECIALTY: \_\_\_\_\_

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ADDRESS: \_\_\_\_\_ EMAIL: \_\_\_\_\_ AGD MEMBER ID (IF APPLIES): \_\_\_\_\_

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### Educational Objectives

- Discuss the history of e-cigarettes
- Identify the many contents in e-liquid
- Describe the vast legislative changes in vaping within the last several years
- List the negative effects of vaping on the human body
- Utilize the educational flowchart in your own clinical practice setting for educating patients about vaping

### Course Evaluation

- Were the individual course objectives met?  

Objective #1: Yes No	Objective #3: Yes No	Objective #5: Yes No	
Objective #2: Yes No	Objective #4: Yes No		

Please evaluate this course by responding to the following statements, using a scale of Excellent = 5 to Poor = 0.

- |   |       |    |   |   |   |   |
|---|-------|----|---|---|---|---|
| 2. To what extent were the course objectives accomplished overall?                            | 5     | 4  | 3 | 2 | 1 | 0 |
| 3. Please rate your personal mastery of the course objectives.                                | 5     | 4  | 3 | 2 | 1 | 0 |
| 4. How would you rate the objectives and educational methods?                                 | 5     | 4  | 3 | 2 | 1 | 0 |
| 5. How do you rate the author's grasp of the topic?   | 5     | 4  | 3 | 2 | 1 | 0 |
| 6. Please rate the author's effectiveness.  | 5     | 4  | 3 | 2 | 1 | 0 |
| 7. Was the overall administration of the course effective?                                    | 5     | 4  | 3 | 2 | 1 | 0 |
| 8. Please rate the usefulness and clinical applicability of this course.                      | 5     | 4  | 3 | 2 | 1 | 0 |
| 9. Please rate the usefulness of the references.  | 5     | 4  | 3 | 2 | 1 | 0 |
| 10. Do you feel that the references were adequate?  | Yes   | No |   |   |   |   |
| 11. Would you take a similar course on a different topic?                                     | Yes   | No |   |   |   |   |
| 12. If any of the continuing education questions were unclear or ambiguous, please list them. | _____ |    |   |   |   |   |

13. Was there any subject matter you found confusing? Please describe.  
\_\_\_\_\_

14. How long did it take you to complete this course?  
\_\_\_\_\_

15. What additional dental continuing education topics would you like to see?  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Mail/fax completed answer sheet to:

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| 3. (A) (B) (C) (D)  | 18. (A) (B) (C) (D) |
| 4. (A) (B) (C) (D)  | 19. (A) (B) (C) (D) |
| 5. (A) (B) (C) (D)  | 20. (A) (B) (C) (D) |
| 6. (A) (B) (C) (D)  | 21. (A) (B) (C) (D) |
| 7. (A) (B) (C) (D)  | 22. (A) (B) (C) (D) |
| 8. (A) (B) (C) (D)  | 23. (A) (B) (C) (D) |
| 9. (A) (B) (C) (D)  | 24. (A) (B) (C) (D) |
| 10. (A) (B) (C) (D) | 25. (A) (B) (C) (D) |
| 11. (A) (B) (C) (D) | 26. (A) (B) (C) (D) |
| 12. (A) (B) (C) (D) | 27. (A) (B) (C) (D) |
| 13. (A) (B) (C) (D) | 28. (A) (B) (C) (D) |
| 14. (A) (B) (C) (D) | 29. (A) (B) (C) (D) |
| 15. (A) (B) (C) (D) | 30. (A) (B) (C) (D) |

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