

Vaping: It's All a Smokescreen

Janice Selekmán

Smoking and its associated nicotine addiction are back. Not the kind of smoking of the past made of rolled tobacco in a pack of 20, but rather, new electronic devices, some no bigger than a thumb drive. It is the new epidemic affecting adolescents. For decades, healthcare providers fought to decrease smoking among youth, and success was within our grasp, but the tobacco companies came roaring back.

According to the Youth Risk Behavior Survey, the percentage of adolescents experimenting with cigarettes, even one puff, has decreased significantly from 70% in 1991 to 58.4% in 2003 to 28.9% in 2017 (Centers for Disease Control and Prevention [CDC], 2018a); of this latest group of youth of 9th through 12th graders, 9.5% indicated they had tried smoking before they were 13 years of age and 8.8% currently smoked cigarettes. However, that same survey found that 42.2% had tried an electronic vapor product, and 13.2% were current users of electronic cigarettes (CDC, 2018a). These facts have significant implications for the pediatric nurse.

Tobacco

Cigarette smoke contains almost 7,000 chemicals, 69 of which cause cancer (American Lung Association [ALA], 2017). The primary ingredient in cigarettes is tobacco, a known carcinogen that contains nicotine and is sprayed in the growing process with numerous chemicals. Tar is another major component of smoking and occurs when the tobacco is burned or smoked. Tar is a sticky black liquid that sticks to cells in the lung tissue and allows the other carcinogens in the cigarette to stick to it and accumu-

Selekmán, J. (2019). Vaping: It's all a smokescreen. *Pediatric Nursing*, 45(1), 12-15, 35.

The newest fad for youth is dangerous and addictive. While the prevalence of smoking tobacco by teens decreased significantly over the years, nicotine delivery has resurfaced in a new format. Whether referred to as vaping or juuling, the use of electronic cigarettes has implications for the pediatric nurse as well as for the health of youth.

Key Words: Vaping, juuling, smoking, hookah, e-cigarettes, electronic cigarettes, teens, adolescents.

late in that site. Its amount varies from 1 to 15 mg per cigarette, most of which is in the last third of the cigarette.

Nicotine, which is among the most addictive substances, increases the release of acetylcholine neurotransmitters that suppress the appetite, enhance pleasure, and assist in relaxation. Each cigarette contains 8 to 20 mg of nicotine, of which 1 mg is absorbed. The drug acts within seconds of being inhaled (ALA, 2017). Another major component of cigarette smoke is carbon monoxide, which can interfere with hemoglobin function.

The health risks of adult smoking are well known; almost every organ in the body is negatively impacted by smoking. About 90% of lung cancer deaths and 80% of chronic obstructive pulmonary disease are directly caused by cigarette smoking (ALA, 2017). Additionally, coronary heart disease, stroke, diabetes mellitus, rheumatoid arthritis, and a variety of cancers, such as colorectal cancer and cancers of the larynx, mouth, esophagus, stomach, pancreas, kidney, bladder, cervix, and blood, as well as premature death, have been associated with smoking (ALA, 2017; CDC, 2018b). There are approximately 480,000 deaths of adults in the United States each year due to cigarette smoking and second-hand exposure. (Jamal et al., 2018). Nearly 90%

of adults who have been daily smokers at some point reported trying their first cigarette by age 18 years (ALA, 2017). Currently, 15.5% of American adults smoke (Jamal et al., 2018).

According to the U.S. Surgeon General, the developing adolescent brain is particularly vulnerable to the negative effects of exposure to nicotine, including "addiction, priming for use of other addictive substances, reduced impulse control, deficits in attention and cognition, and mood disorders" (U.S. Department of Health and Human Services [DHHS], 2016, p. vii). Youth are at higher risk for becoming dependent on nicotine than adults (CDC, 2017).

Tobacco is considered by many to be a "gateway drug" that opens the door to using illicit drugs. This theory, known as the Gateway Hypothesis, is not universally accepted because there are discrepancies about whether tobacco, alcohol, or marijuana is the initial "gateway" drug that leads to the use of illicit drugs.

Electronic Cigarettes

Use of electronic cigarettes (e-cigarettes) and hookahs have increased significantly among high school students. According to the National Institute on Drug Abuse (NIDA) (2018), e-cigarettes (also known as electronic nicotine delivery systems, e-cigs, e-hookahs, hookah pens,

Janice Selekmán, DNSc, RN, NCSN, FNASN, is a Professor, University of Delaware, Wilmington, DE.

vapes, vape pens, Juuls, or mods) are “battery-operated devices that people use to inhale an aerosol, which typically contains nicotine (though not always), flavorings, and other chemicals” (NIDA, 2018). There are over 460 brands available, the most popular of which is the Juul. E-cigarettes can look like traditional tobacco products (e.g., pipes, cigars, and cigarettes), other everyday items (e.g., USB memory sticks, mascara containers or pens), or a variety of other designs (NIDA, 2018).

Regardless of the design, most e-cigarettes have four different parts: a reservoir or cartridge that holds the liquid solution containing nicotine (sometimes called a pod), flavorings, and other chemicals; a mouthpiece that is used to inhale the liquid solution; an atomizer (heating element); and a power source – typically a battery (NIDA, 2018). When the user puffs on the mouthpiece, the heating element is activated and vaporizes the liquid into a vapor or aerosol that can be inhaled, otherwise known as vaping (NIDA, 2018). Those who use the devices are called vapers. Some refer to the activity as juuling.

The liquid contained in the cartridge is created by extracting nicotine from tobacco and mixing it with a base (e.g., propylene glycol); colorings, flavorings, and other chemicals may also be added (ALA, 2018). It is still unknown what these other chemicals are; however, lab tests performed by the U.S. Food and Drug Administration (FDA) on two leading brands of e-cigarettes detected toxic chemicals that can cause cancer, including an ingredient found in antifreeze (ALA, 2018). Formaldehyde, another carcinogen, was found in the aerosol from e-cigarettes with higher voltage levels (ALA, 2018).

Flavorings are used to market these products to young adults, and these increase their appeal to youth. In fact, taste/flavoring is one of the most commonly cited reasons for e-cigarette use among youth (DHHS, 2016). In 2014, over half (56%) of middle school students and nearly three-fourths (73%) of high school students who used tobacco in the past 30 days used a flavored tobacco product (CDC, 2017). There are over 7,500 e-liquid flavors available (Harrell et al., 2017); examples include caramel candy, clove, vanilla, strawberry, gummy bear, mango, mint, tutti frutti, and crème brûlée.

The flavors used are labeled by the Flavor and Extract Manufacturers’ Association as *generally recognized as safe*. However, these flavors are not necessarily harmless to users because this safety designation only applies to orally ingested food; this means it is safe to eat but does not apply to inhaling such flavorings as is done with e-cigarettes (ALA, 2018). *They have not been tested for lung toxicity in the vaporized form.*

Hookahs are water pipes; they are also called shisha. They vary in size and shape, and were developed to smoke flavored tobacco, usually in a group setting (CDC, 2018c). It is not a safer alternative to regular cigarette use. However, now it has adopted the same technology as the e-cigarette (referred to as a hookah-pen); there is virtually no difference between an e-hookah and an e-cigarette. Hookahs can, however, be used without nicotine, with only the chemicals being inhaled.

Are E-Cigarettes as Dangerous as Regular Cigarettes?

E-cigarettes or vaping are often marketed as a healthier choice than smoking; they do not contain tar and carbon monoxide. However, the nicotine amounts are often higher. JUUL (2018) indicates that each pod contains 40 mg to 59 mg of nicotine, about the same amount as in an entire pack of cigarettes. One pod provides approximately 200 puffs.

E-cigarettes are advertised as an aid to help current adult smokers quit because the levels of toxic substances they contain have been found to be lower than what is present in conventional cigarettes (Hajek, Etter, Benowitz, Eissenberg, & McRobbie, 2014). This perspective is controversial in the public health community, even for adult users. Reasons for the distrust include erroneous advertising in the 1950s with the advent of “light cigarettes,” mistrust of tobacco companies’ intentions with producing and marketing these products, and the lack of evidence about the long-term health effects of e-cigarette use or its effectiveness in reducing conventional cigarette use. In one study, only 9% of those who tried to use e-cigarettes to decrease their use of traditional cigarettes were successful in quitting (Franck, Filion, Kimmelman, Grad, & Eisenberg, 2016).

Vaping results in the inhalation of the nicotine in the e-liquids into the lung, where it is absorbed into the bloodstream; it stimulates the adrenal gland to release epinephrine (adrenaline) (NIDA, 2018). As with any nicotine product, it stimulates the central nervous system, increases the heart and respiratory rates, and increases blood pressure. It is known that high levels of nicotine in adults can result in increased risk to those with cardiac disease because it increases cardiac adrenaline levels. In addition, nicotine is addictive. There is no standard measurement to define the intensity of e-cigarette inhalation, such as when asking individuals to tell you how many cigarettes they smoke in a day or how much of the cigarette they smoke. In addition, the amount of nicotine varies based on the different devices used, the vaping technique used, and the intensity of inhaling.

Youth report that inhalation of vapors is less harsh than inhaling burned tobacco (Watson, 2018). Vaping of nicotine at a young age can “reduce prefrontal cortex activity and negatively affect concentration and memory” (Watson, 2018). Some of the flavoring chemicals include an agent (cinnamaldehyde) that can impair lung function in human bronchial epithelial cells (Watson, 2018). The formaldehyde used in the liquid cartridge is a known carcinogen. Vaping allows the particles to be deposited deeper in the lung, and biopsies from chronic vapers demonstrate a change in lung tissue (Watson, 2018). One small study found that two known carcinogens were found in the urine of those who used e-cigarettes but not in non-users (Fuller et al., 2017).

For those using the shisha pen or e-hookah pen that are nicotine-free, Kienhuis and colleagues (2015) found that the vapor that results from the propylene glycol and glycerol, which are its main components, can cause problems. “After one puff of the shisha pen, the concentrations of propylene glycol and glycerol are sufficiently high to potentially cause irritation of the airways” (Kienhuis et al., 2015, p. 15).

A possible danger of using e-cigarettes are the metals released when the heating coil is activated. These metals (lead, chromium, nickel, and manganese) may also cause lung tissue damage (Watson, 2018). Another consequence of vaping is *popcorn lung*, also called bronchiolitis obliterans.

This serious and irreversible scarring of the bronchioles occurs after vaping the chemical diacetyl found in the buttery flavorings of popcorn, vanilla, maple, and coconut (ALA, 2018). There is no cure for this condition.

Some youth using e-cigarettes engage in a practice called “dripping,” where e-liquid drops are placed directly onto the atomizer coils and heated to produce a vapor that can be inhaled (NIDA, 2018). One in four high school students report practicing dripping and report engaging in these activities for reasons such as creating a thicker vapor, improving flavors, and producing a stronger throat hit (i.e., contraction of the throat, which creates a pleasing sensation) (NIDA, 2018).

Advertising touts using e-cigarettes to decrease reliance on regular cigarette use; however, multiple studies show that those who use e-cigarettes regularly are more likely to eventually switch to smoking other tobacco products (NIDA, 2018). Some evidence suggests that youth may be sensitive to nicotine, and compared to adults, may become dependent on it sooner. Some youth may also find it harder to quit smoking due to genetic factors (CDC, 2017). While safety is a major concern, it should be noted that the FDA only started regulating electronic cigarettes as tobacco products in 2016.

The Lure of the E-Cigarette

Teens and emerging adults will tell you that vaping is cool; it is easy to hide the implements in a shirt pocket or up one’s sleeve. It is easy to take a quick puff between classes without needing matches or having the tell-tale odor of tobacco; the vapor quickly dissipates in the air, decreasing the risk of being discovered. There is a whole juuling culture online with YouTube videos demonstrating how to hide them in highlighters and even specially designed clothes and backpack straps with hidden compartments for the devices. The YouTube videos also demonstrate how to do tricks with the smoke, like blowing rings.

Risk factors related to youth tobacco use include social and environmental factors, biological and genetic factors, mental health, personal perceptions, and family and personal factors. Youth may be more likely to smoke if they are exposed to it

through advertising or perceive it to be a normal activity as portrayed in the mass media, have peers who use tobacco or see it as acceptable, or have parents who smoke (CDC, 2017). Advertising for e-cigarettes and vaping increased significantly from 2014 to 2016, so that over 78% of middle and high school students were exposed to one of the ads (Marynak, Gentzke, Wang, Neff, & King, 2018). Sources of ads are retail stores, the Internet, television, radio, newspapers, and magazines.

When youth expect positive outcomes from smoking, such as weight management or stress reduction, they may be more likely to smoke. Depression, stress, and anxiety are also strongly related to youth smoking (CDC, 2017). The availability of flavors is enticing, as is the belief that e-cigarettes are less harmful than other forms of tobacco. In addition, they cost less than traditional tobacco products (Tsai et al., 2018).

Other important factors related to youth tobacco use include low resistance skills, self-esteem, or academic achievement, as well as low parental involvement and support (CDC, 2017). Because it is illegal for them to buy, youth find others to access the tobacco. They may lie about using it and try to cover the smell by using mouthwash before they see their parents.

There is widespread agreement that sales of e-cigarettes to youth should be restricted, and that youth should not use e-cigarettes because nicotine use during adolescence heightens the risk of addiction and harms the developing brain (DHHS, 2016).

Evidence supporting the negative impact of e-cigarette use in youth, along with continued uncertainty about the impact of long-term use, has prompted policies to protect youth. In August 2016, the FDA extended its regulatory authority to include e-cigarettes, allowing it to regulate the manufacturing, distribution, and marketing of these products under the auspices of the Family Smoking Prevention and Tobacco Control Act (FDA, 2018). Prior to this, the federal government had no legal authority to prevent the sale of e-cigarettes to youth under age 18. Now, products must carry a warning about nicotine, there are minimum age restrictions that prevent selling products to minors, and sales through vending machines in facilities that

admit youth are prohibited (DHHS, 2016). In addition, the FDA issued a warning to the manufacturers of the five top selling e-cigarettes in Fall 2018 to develop plans to stop the sale of these products to minors.

From Nicotine To Marijuana

According to the U.S. Surgeon General, e-cigarette products can also be used to deliver cannabinoids and may also potentially be used to deliver other illicit drugs (DHHS, 2016). Cannabis (marijuana) or hash oil can be used in e-cigarettes. As marijuana becomes more acceptable and legalized in states, it is being perceived as less harmful than tobacco. Its oil is increasingly being used in electronic vaping devices. Over 12% of high school students and 4.5% of middle school students have vaped marijuana (Trivers, Phillips, Gentzke, Tynan, & Neff, 2018). It is very difficult by looking at the cartridge to tell if the pod container has a nicotine e-liquid or cannabis. It may not even have a smell that is detectable to others. Trivers and colleagues (2018) and Audrain-McGovern, Stone, Barrington-Trimis, Unger, and Leventhal (2018) found that teens who used e-cigarettes with nicotine liquid, especially if use occurred around age 14 years, were 3.6 to 4 times more likely to use marijuana 2 years later. They also found an increase in use in those who live in a household with other tobacco users.

Safety Issues

A number of safety issues are related to e-cigarettes. Although no matches are required, pediatric nurses should be aware of the risk of the lithium ion batteries of e-cigarettes exploding, causing serious burns, bleeding, and localized injury. It can occur with overheating, exposure to water, contact with metallic objects (such as keys), and improper charging (Palmer, 2018). If this injury should occur, Palmer (2018) recommends the use of mineral oil for initial wound irrigation to remove any remaining alkaline material left on the tissues. The exploding e-cigarettes might also be a fire hazard for the school, home, or hospital. It is important *not* to irrigate these burns with water until pH is no longer alkaline.

There are increased reports of young children swallowing the nico-

tine-laced liquid, known as e-juice/vape juice used in the e-cigarette; these have resulted in calls to Poison Control and visits to the emergency room for nicotine poisoning. Current packaging for containers of the liquids used for vape products looks like common kid-friendly food products, such as juice boxes. The amount of nicotine in one juul pod is the equivalent of 20 cigarettes. Increased nicotine exposure can lead to seizures, respiratory failure, and cardiac arrest.

There is also the risk of secondhand smoke resulting from use of e-cigarettes, although the extent is unknown. Over 6 million students reported secondhand exposure (Wang, Marynak, Agakku, & King, 2017). Indoor air policies are the best way to prevent involuntary exposure to nicotine and other e-cigarette emissions; only eight states have comprehensive indoor air laws that prohibit e-cigarettes (Wang et al., 2017). The remnants of the vapor can remain on household surfaces for some time; the impact of this on the health of those in the environment is not known (Watson, 2018).

Implications for Pediatric Nurses

Tobacco use continues to be the leading cause of preventable death in America, and it usually begins during adolescence, making this a crucial time for primary and secondary prevention efforts. Whether as an inpatient or outpatient, or in the schools, youth are asked if they smoke cigarettes. This question needs to be broadened to assess for the potential for nicotine abuse to include using e-cigarettes, juuling, or vaping.

To assess for dependence on nicotine and to plan interventions, the “5 A’s” (Ask, Advise, Assess, Assist, Arrange) can be used. The steps include:

- **Ask** about the person’s smoking status with questions, such as:
 - a. Have you ever tried to quit, but couldn’t?
 - b. Do you ever have strong cravings to smoke or felt like you really needed a cigarette or a hit or puff via a vaping device?
 - c. When you try to stop or stop for a while, do you find it hard to concentrate, or feel more irritable or nervous?
- **Advise** the person to stop smoking.

- **Assess** their willingness to quit.
- **Assist** and **Arrange** for a brief intervention and follow up (Agency for Healthcare Research and Quality [AHRQ], 2012).

It is also important to find out what the young person likes about engaging in vaping so you can understand their rationale and attempt to correct misperceptions. What makes it attractive? For many, it is initially to test limits and experiment; for others, it is feeling like an adult, the ability to make a cloud of smoke, or merely enjoying the flavors. For some, it is a way to deal with stress, especially among the lesbian, gay, bisexual, and transgender communities, where vaping activities are higher (Dupuis, 2018). It might be appropriate to state that we don’t experiment with seat belts, helmets, sunscreen to see if the devastating effects of trauma or skin cancer develop.

A 2014 report by the U.S. Surgeon General concluded that multiple population-level interventions have reduced youth tobacco use, including litigation against tobacco companies, increasing the cost of tobacco products (e.g., excise taxes), mass media campaigns, and comprehensive statewide tobacco control programs and community programs (DHHS, 2014). Therefore, a comprehensive approach to this problem is needed, including regulation, education, and economic and social strategies. This comprehensive approach also includes a partnership with parents.

The CDC’s guidelines for school health programs recommend that tobacco use be prohibited in all school facilities and at all school events (CDC, 2015). Consistent with these guidelines, a “tobacco-free environment” is mandated in most schools. This needs to be expanded to a “vaping-free environment.” Still, tobacco use occurs at school. For example, bathrooms are often places where students go to sneak a cigarette. If anyone enters, they can quickly flush it down the toilet. This suggests that faculty and staff should routinely monitor the bathrooms between classes. It is harder, however, to detect if e-cigarettes are being used, and they can quickly be hidden in one’s clothes.

Few teens stop smoking without some type of external intervention, and while many psychosocial interventions have produced short-term successes, over 50% of youth participating in cessation intervention stud-

ies between 2009 and 2014 still smoked once treatment was over (Simon, Kong, Cavallo, & Krishnan-Sarin, 2015). This points to the importance of primary prevention in preventing dependence on tobacco and the development of tobacco-related illnesses. Nonsmokers should be praised for making “smart choices” and alternatives provided for those who have just begun smoking.

Conclusion

Two million American teens are using some form of electronic cigarette. The use of these devices is not a harmless fad; it is addictive. Nearly all tobacco use in the United States begins during the teenage years. Until more research is done, especially on the long-term effects of vaping, it must be stressed that less toxic is still toxic. Pediatric nurses must be aware of the practice and its variations and possible effects on the body; pediatric nurses have an important role in preventing or decreasing this practice. ■

References

- Agency for Healthcare Research and Quality (AHRQ). (2012). *Five major steps to intervention (the “5 A’s”).* Retrieved from <https://www.ahrq.gov/professionals/clinicians-providers/guidelines-recommendations/tobacco/5steps.html>
- American Lung Association (ALA). (2017). *Health effects of smoking.* Retrieved from <http://www.lung.org/stop-smoking/smoking-facts/health-effects-of-smoking.html>
- American Lung Association (ALA). (2018). *E-cigarettes.* Retrieved from <http://www.lung.org/stop-smoking/smoking-facts/e-cigarettes-and-lung-health.html>
- Audrain-McGovern, J., Stone, M.D., Barrington-Trimis, J., Unger, J.B., & Leventhal, A.M. (2018). Adolescent e-cigarette, hookah, and conventional cigarette use and subsequent marijuana use. *Pediatrics*, 142(3). doi:10.1542/peds.2017-3616.
- Centers for Disease Control and Prevention (CDC). (2015). *Tobacco use prevention through schools.* Retrieved from <https://www.cdc.gov/healthyschools/tobacco/index.htm>
- Centers for Disease Control and Prevention (CDC). (2017). *Youth and tobacco use.* Retrieved from https://www.cdc.gov/tobacco/data_statistics/fact_sheets/youth_data/tobacco_use/index.htm
- Centers for Disease Control and Prevention (CDC). (2018a). *Youth Risk Behavior Surveillance System (YRBSS).* Retrieved from <https://www.cdc.gov/healthyYouth/data/yrebs/index.htm>

continued on page 35

Vaping

continued from page 15

- Centers for Disease Control and Prevention (CDC). (2018b). *Health effects of cigarette smoking*. Retrieved from https://www.cdc.gov/tobacco/data_statistics/fact_sheets/health_effects/effects_cig_smoking/index.htm
- Centers for Disease Control and Prevention (CDC). (2018c). *Hookahs*. Retrieved from https://www.cdc.gov/tobacco/data_statistics/fact_sheets/tobacco_industry/hookahs/index.htm
- Dupuis, A. (2018). *Smoking and vaping: Bigger in the LGBT community? Insight*. Retrieved from <http://instinctmagazine.com/post/smoking-and-vaping-bigger-lgbt-community-new-study-teens-sheds-light-matter>
- Franck, C., Fillion, K.B., Kimmelman, J., Grad, R., & Eisenberg, M.J. (2016). Ethical considerations of e-cigarette use for tobacco harm reduction. *Respiratory Research*, 17(1), 53. doi:10.1186/s12931-016-0370-3
- Fuller, T., Acharya, A., Bhaskar, G., Yu, M., Little, S., & Tarin, T. (2017). MP88-14 evaluation of e-cigarette users' urine for known bladder carcinogens. *The Journal of Urology*, 197(4), e1179.
- Hajek, P., Etter, J.F., Benowitz, N., Eissenberg, T., & McRobbie, H. (2014). Electronic cigarettes: Review of use, content, safety, effects on smokers, and potential for harm and benefit. *Addiction*, 109(11), 1801-1810. doi:10.1111/add.12659
- Harrell, M.B., Weaver, S.R., Loukas, A., Creamer, M., Marti, C.N., Jackson, C.D., ... Erikson, M.P. (2017). Flavored e-cigarette use: Characterizing youth, young adult, and adult users. *Preventive Medicine Reports*, 5, 33-40.
- Jamal, A., Phillips, E., Gentzke, A.S., Homa, D.M., Babb, S.D., King, B.A., & Neff, L.J. (2018). Current cigarette smoking among adults – United States, 2016. *Morbidity and Mortality Weekly Report*, 67(2), 53-59.
- JUUL. (2018). *JUULpod basics*. Retrieved from <https://support.juul.com/home/learn/faqs/juulpod-basics>
- Kienhuis, A.S., Soeteman-Hernandez, L.G., Bos, P.M., Cremers, H.W., Klerx, W.N., & Talhout, R. (2015). Potential harmful health effects of inhaling nicotine-free shisha-pen vapor: A chemical risk assessment of the main components propylene glycol and glycerol. *Tobacco Induced Diseases*, 13(1), 15.
- Marynak, K., Gentzke, A., Wang, T.W., Neff, L., & King, B.A. (2018). Exposure to electronic cigarette advertising among middle and high school students – United States, 2014-2016. *Morbidity and Mortality Weekly Report*, 67(10), 294-299.
- National Institute on Drug Abuse (NIDA). (2018). *Electronic cigarettes*. Retrieved from <https://www.drugabuse.gov/publications/drug-facts/electronic-cigarettes-e-cigarettes>
- Palmer, C. (2018, February 9). Exploding e-cigs can cause grievous injuries. *Pediatric News*. Retrieved from <https://www.mdedge.com/pediatricnews/article/158298/injuries/exploding-e-cigs-can-cause-grievous-injuries>
- Simon, P., Kong, G., Cavallo, D.A., & Krishnan-Sarin, S. (2015). Update of adolescent smoking cessation interventions: 2009-2014. *Current Addiction Reports*, 2(1), 15-23. doi:10.1007/s40429-015-0040-4
- Trivers, K.F., Phillips, E., Gentzke, A., Tynan, M.A., & Neff, L.J. (2018). Prevalence of cannabis use in electronic cigarettes among US youth. *JAMA Pediatrics*, 172(11), 1097-1099. doi:10.1001/jama.pediatrics.2018.1920
- Tsai, J., Walton, K., Coleman, B.N., Sharapova, S.R., Johnson, S.E., Kennedy, S.M., & Caraballo, R.S. (2018). Reasons for electronic cigarette use among middle and high school students – National Youth Tobacco Survey, United States, 2016. *Morbidity and Mortality Weekly Report*, 67(6), 196-200.
- U.S. Department of Health and Human Services. (2014). *The health consequences of smoking – 50 years of progress: A report of the Surgeon General*. Retrieved from <https://www.surgeongeneral.gov/library/reports/50-years-of-progress/exec-summary.pdf>
- U.S. Department of Health and Human Services. (2016). *E-Cigarette use among youth and young adults: A report of the Surgeon General*. Retrieved from https://e-cigarettes.surgeongeneral.gov/documents/2016_SGR_Exec_Summ_508.pdf
- U.S. Food and Drug Administration. (2018). *FDA's deeming regulations for e-cigarettes, cigars, and all other tobacco products*. Retrieved from <https://www.fda.gov/TobaccoProducts/Labeling/RulesRegulationsGuidance/ucm394909.htm>
- Wang, T.W., Marynak, K.I., Agakku, I.T., & King, B.A. (2017). Secondhand exposure to electronic cigarette aerosol among US youths. *JAMA Pediatrics*, 171(5), 490-492.
- Watson, J. (2018). *In a haze about e-cigarettes? 5 things to know*. Retrieved from <https://www.medscape.com/viewarticle/899866>