Tobacco Cessation: Electronic Cigarettes

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Tobacco has been used in various ways since its existence and the levels of use are significantly increasing due to the numerous forms of tobacco that are being marketed. While tobacco has many forms, the most popular in recent times, is the electronic cigarette, also known as, e-cigarette. Even with the age restriction present on the use of tobacco, there are plenty of teens that manage to get their hands on e-cigarette devices that contain harmful ingredients. Not only does the use of tobacco products; such as, e-cigarettes have effects on oral health, but also, have effects on overall systemic health. As future dental health professionals, it is crucial to understand and to be able to counsel patients regarding tobacco cessation by educating them.

E-Cigarette Usage and Ingredients

These e-cigarettes contain many compounds and chemicals that are still in need of much more research. However, out of the substances that have been identified in the liquids and aerosols of e-cigarettes, it includes, "… nicotine, solvent carriers (PG and glycerol), tobacco-specific nitrosamines (TSNAs), aldehydes, metals, volatile organic compounds (VOCs), phenolic compounds, polycyclic aromatic hydrocarbons (PAHs), flavorings, tobacco alkaloids, and drugs (NASEM, 2018)." From the research that exists, the National Academies of Sciences, Engineering, and Medicine, has stated that there is conclusive evidence that most e-cigarettes contain nicotine, numerous toxic substances that differ in their respective effects, and metals (NASEM, 2018). Though many may claim that the use of e-cigarettes is a healthier alternative to smoking cigarettes, there is a limited amount of applicable research to back this claim.

Throughout the years, many variations of e-cigarettes have been made. They come in many different shapes and sizes. According to the National Institute on Drug Abuse, there are,

"Some e-cigarettes are made to look like regular cigarettes, cigars, or pipes. Some resemble pens, USB sticks, and other everyday items (NIDA, 2020)." Though the different devices may vary in their design, the function and usage are usually quite similar for the user. Each device is equipped with a mouthpiece, a fixed or removable reservoir that holds the liquid components, a heating source and a battery source that powers the heating source. With all these parts in place, a user is able to experience similar effects of smoking through a vaporized liquid, produced by the device, by simply "puffing" on the mouthpiece. Commonly, the use of e-cigarettes is referred to as "vaping". The ease of use of e-cigarettes and their "disguised" look may be attributed to the increased use in frequency, and prevalence of usage amongst teens.

Impact on Oral Hygiene

Smoking cigarettes has been a known cause of poor oral health due to the extensive research that has been done. Smokers are known to have increased risks of oral cancer and gum disease. They are also unable to heal from gum disease due to reduction of oxygen flow in the bloodstream. Because e-cigarettes have become the newer alternative to smoking cigarettes, there is no concrete evidence that confirms the same effects for e-cigarettes.

In 2016, the CDC conducted a health survey through the Behavioral Risk Factor Surveillance System (BRFSS). A cross-sectional analysis was done of this BRFSS data in 2019. Poor oral health was defined by a state in which a respondent has lost a permanent tooth due to a cause that was not traumatic. Out of the hundreds of thousands of respondents, only about 15% reported that they smoked within the past 30 days. However, a statistical analysis found that, "Poor oral health was more prevalent than good oral health among daily e-cigarette users (55.5 versus 44.5%... [and] daily e-cigarette use was associated with 78% higher odds of having poor

oral health. (Huilgol, et al., 2019).", leading to the conclusion that e-cigarette usage will have a high chance of developing poor oral health; such as, periodontal disease and tooth loss.

Additionally, other analyses and studies of e-cigarette users have suggested that there is a higher level of gram-negative bacteria present, an increase inflammation of the gingival tissue and an increased risk of caries development. An analysis of the salivary microbiome confirmed that, "…the abundance of the Gram-negative bacteria *Prophyromonas* and *Veillonella* was higher among e-cigarette users compared with conventional cigarette smokers or never smokers (Almeida-da-Silva, et al., 2021)." While a pilot study had stated that there was a, "…significant increase in gingival inflammation when participants switched from smoking conventional cigarettes to e-cigarettes (Almeida-da-Silva, et al., 2021)," a more controlled study revealed that pro-inflammatory markers were only found I elevated amounts in conventional smokers. Another study also found a relationship between sweet flavor e-cigarettes and oral health. They found that sweet flavored e-cigarettes may lead to a higher risk for caries. The research that is being presented at this time is still relatively short-term compared to that of conventional cigarettes, therefore, studies and their respective results must be taken with a grain of salt.

Impact on Systemic Health

Before the era of e-cigarettes, smoking was only common for those who were well aged and those who may pick up a cigarette in their 20s may be rare. After e-cigarettes have been heavily marketed and popularized by social media, many teens have gotten their hands on them to use from a very young age. "Even though there are fewer components in e-cigarettes compared to conventional cigarettes, e-cigarettes still contain toxic and cancer-causing residues… (Almeida-da-Silva, et al., 2021)." The risks may be perceived as less compared to

conventional cigarettes, but the risk e-cigarettes still remain widely unknown due to inability to understand the long-term effects. With the many ingredients still needing more research, systemic health can be of concern.

An e-cigarette has aerosol components that may be of concern due to the electronic-cigarette or vaping product use-associated lung injury (EVALI) outbreak in 2019, in which many patients were being presented with respiratory issues and lung problems due to the use of e-cigarettes. The problems that were of concern for the patient included nausea, vomiting, shortness of breath and chest pain. "According to the CDC, as of February 18, 2020, a total of 2,807 hospitalized cases or deaths…15% were under 18 years of age, 78% (the majority) were between the age of 18 and 34… (Almeida-da-Silva, et al., 2021)." There are many teens that are getting involved in the new statistic of lung injuries, which raises concerns for what may occur in the events of long-term usage of e-cigarettes.

In order for such questions to be answered, research was done in order to see the effects of conventional cigarette usage, e-cigarette usage and dual usage on adolescents in the United States. "…nicotine exposure during adolescence has adverse effects on brain development that may lead to long-lasting vulnerability to nicotine and other substances of abuse (McCabe, et al., 2017)." Due to the nature that e-cigarettes are made with nicotine in many cases, it may present harmful effects to adolescents who may still be developing.

> "The present study provides new evidence that any e-cigarette use is associated with increased risk of a wide range of school and substance-related risk behaviors relative to nonuse…The robust associations between e-cigarette use and multiple risk behaviors in the present study suggest behavior clustering that may form a risk behavior syndrome

representing a problem behavior more similar to cigarette smoking than nonuse (McCabe, et al., 2017)."

Though research of the topic of e-cigarettes in its entirety is limited in many aspects, this study shows the association of tobacco usage and problem behaviors. In the study, the researchers relate the risk behaviors and problem behaviors to that of cigarette users. Some of the problem behaviors that were observed during the span of this research are truancy, consumption of alcohol, use of marijuana, and use of illicit and/or nonmedical prescription drugs. Knowing that e-cigarette usage may cause problems with the oral health and systemic health, it is not worth the risk of having to deal with the other substance abuse that may stem off of e-cigarette usage.

Because electronic cigarettes are fairly new and have limited research to understand the adverse effects to the fullest, long-term effects are also not known as well as that of conventional smoking. In a longitudinal study conducted in the United States to find an answer for tobacco cessation, it was concluded that, "Short-term e-cigarette use was not associated with a lower rate of smoking cessation. Long-term use of e-cigarettes was associated with a higher rate of quitting smoking (Zhuang, et al., 2016)." Though this posed a solution conventional smoking, it pushed the same people to another form of tobacco that may pose the same, or a greater amount of harm to their oral and system health.

Smoking Counseling and Dental Visits

Dental hygienists are the bridges between the patient and good oral health. While oral health may be considered different from a totally different system, everything in our bodies is interlinked. If our bodies are unhealthy, our oral health can be affected, and vis versa. The scope of work of a dental hygienist is to ensure that there is maintenance of a health oral cavity in each

and every patient that are seen, whether their conditions may vary from reversible to irreversible. Patients who are presented with tobacco use may be more prone to gum disease inability to heal traumatized tissue in their oral cavities.

As oral health professionals, the role that dental hygienists have is to educate and encourage improvements in patients' home care and self-care. Smoking counseling with a patient is crucial to manage oral health and promote a healthier lifestyle. By counseling a patient to cease the use of tobacco in all its various forms, more illnesses in systemic health and oral health can be prevented. Smoking increases chances of cancer, not only in the head and neck region, but also, in the lungs and skin.

Smoking Counseling

No matter how old the patient is, it is not late to quit because significant improvements are made on that patient's health as soon as they put the tobacco down. For every patient who is presented as a smoker, a safe space should be created for them so that they may feel comfortable talking to their provider about their usage. The environment must be one that is free of judgment. After duration of smoking period is revealed, varying steps can be taken in order to have more effective results.

If a teenager is presented as a patient and states that he or she has started smoking two months ago, dental hygienist should educate the teenager into how tobacco usage may harm not only their oral health, but their systemic health. A background of how the patient started using tobacco products should be built up through interviewing so that their situation can be understood. This can include asking if anyone in their household uses tobacco products and why the patient started using the tobacco product. The patient can also be asked to weigh the risks and

benefits after the conversation of health concerns. If there are habitual uses of tobacco, the patient would be advised to attempt to fight the urge by staying conscious of what they are doing and reflecting back on the conversation that was held that day.

In the case of a 30-year-old who has been smoking for twelve years, the same conversation on oral health effects and systemic health risks will be held. The same steps mentioned above can help if patients are very willing to quit, but in some cases, it may be more difficult that "fighting the urge". The severity; frequency and amount of tobacco usage, is also important when considering any way to present tobacco cessation counseling. Because long-term smokers are more prone to various diseases pertaining to the oral cavity, the patient may already notice the effects that tobacco has on their health. Tobacco cessation counseling should be presented to patients in a realistic manner and the patients should be the ones that should decide what seems like the most realistic path to successfully stop smoking. Patients who are willing to quit should be provided with resources, such as, follow-up during each dental visit and referrals. During each visit, the patient should be encouraged to slowly quit smoking and progress of oral health (if seen) should be mentioned. In cases in which patients are not willing to quit, or haven't thought about quitting, they should be motivated to do so by helping them understand the benefits of quitting. Another key component to counseling is to remember to be patient with the patient so that they do not feel rushed or judged.

Once patients have successfully quit smoking, it is important that follow up continues so that patient relapse does not occur. The Five A's Model (Ask, Advise, Assess, Assist and Arrange) will be used in both scenarios to determine the best route to take with each patient. It is important that the patient is reminded that they are not alone, but that the dental hygienist is also on this journey with them, to help them quit smoking.

In conclusion, tobacco use takes on many different forms. The most popular that has been observed throughout history is the conventional smoking of cigarettes. In recent times, electronic cigarettes have taken over the market, causing consumption rates of e-cigarette products to surge. Equally, the usages have increased drastically despite conducted research on the effects of the vast amounts of new ingredients are still a blur. There have been various claims of e-cigarettes being able to increase rates of tobacco cessation, however, the use of e-cigarettes still pose risk and harm to oral health and systemic health. The general use of e-cigarettes has pointed in the direction of being more prone to inflammation of gingival tissue, gum disease and in some cases, caries development. While e-cigarettes can be equally as addictive to conventional cigarettes because of nicotine, they should not be viewed as any safer than the latter. Dental hygienists are in charge of providing preventative care and education to patients so that improvements may be observed in patients. Dental hygienists must, not only assess and treat each patient using tobacco, but also provide an appropriate referral and realistic and executable plan for the patient to follow so that patients may achieve and maintain good oral and systemic health.

References

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Reflection

Overall, I learned that e-cigarettes and their usage does not have a lot of research, which was, not only frustrating to write the paper, but also worrisome as I know many people who use electronic cigarettes. Preparing for and completing the assignment helped in broadening my understanding of tobacco and the associated risks.

With the clearer understanding, it is beneficial in a sense that will definitely keep me up on my toes. As new research comes out, it will be crucial for me to keep myself updated on risks so that patients may be informed accordingly. The assignment helped me in helping me put my thoughts of speaking to a patient into words, which will also help me in verbalizing when having a conversation with future patients about smoking cessation. Though I do not feel more confident because it was not a verbally presented assignment, I feel more knowledgeable and prepared to discuss on the topic of smoking cessation.