UTILIZING EVIDENCE-BASED EDUCATION TO INCREASE PARENTAL KNOWLEDGE OF ADOLESCENT VAPING

by

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As members of the DNP Project Committee, we certify that we have read the DNP project prepared by Hayley Rebecca Comrie, titled Utilizing Evidence-Based Education to Increase Parental Knowledge of Adolescent Vaping, and recommend that it be accepted as fulfilling the DNP project requirement for the Degree of Doctor of Nursing Practice.

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Final approval and acceptance of this DNP project is contingent upon the candidate's submission of the final copies of the DNP project to the Graduate College.

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LAND ACKNOWLEDGEMENT

We respectfully acknowledge the University of Arizona is on the land and territories of Indigenous peoples. Today, Arizona is home to 22 federally recognized tribes, with Tucson being home to the O'odham and the Yaqui. Committed to diversity and inclusion, the University strives to build sustainable relationships with sovereign Native Nations and Indigenous communities through education offerings, partnerships, and community service.

DEDICATION

This project is dedicated to my family, who has supported me throughout this challenging journey. A special thank you to my wife, Morgan, who has always been my cheerleader; I could not have made it to where I am without your love, encouragement, patience, and support.

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ABSTRACT

Purpose: This quality improvement project aimed to provide the parents of adolescents aged 11-14 years with the evidence-based parental toolkit handout from CATCH My Breath to increase their knowledge about electronic cigarettes (e-cigarettes) and their associated health risks.

Background: E-cigarettes are now the most popular nicotine delivery system in the United States. In 2022, 1 in 10 middle and high school students self-reported using e-cigarettes in the last month. Many physical and mental health risks are associated with using e-cigarettes, some of which specifically affect adolescents during a time of growth and development. Parents can influence their child's behaviors actively. Improving parents' knowledge can indirectly decrease adolescents' future use of e-cigarettes. Pediatric primary care providers are in a unique position to educate about e-cigarettes and the dangers they pose to one's health and provide support and resources for those in need.

Methods: This project utilized pre- and post-educational surveys to assess changes in parental knowledge of e-cigarettes and their associated health risks after delivering the evidence-based CATCH My Breath parental toolkit handout and associated educational session. Through convenience sampling, participants were recruited from the Banner Health Center at Queen Creek. Participants were parents of adolescents aged 11-14 years attending well-child visits. Descriptive statistics and a paired t-test were utilized to analyze the results.

Results: A total of eight participants completed the pre-educational survey, received the CATCH My Breath parental toolkit handout and educational session, and completed the post-educational survey. Data analysis showed a statistically significant increase in knowledge scores from pre- to

post-educational surveys ($p<0.001$). Participants also reported satisfaction with the educational session.

Conclusions: The evidence-based parental toolkit handout on e-cigarettes and their associated health risks increased parental knowledge on this topic. This intervention was successfully implemented at the Banner Health Center at Queen Creek and can be utilized for future application at well-child visits at this clinic.

INTRODUCTION

Adolescent use of electronic cigarettes (e-cigarettes) has skyrocketed in the past decade, with about 1 in 10, or more than 2.5 million, United States (US) middle and high school students self-reporting using e-cigarettes within the last 30 days and more than 1 in 4 of those using them daily (US Food & Drug Administration [FDA], 2022). E-cigarettes are now the most popular nicotine delivery modality in the US (Centers for Disease Control and Prevention [CDC], 2022). This growing epidemic poses the potential for serious health problems, including a dependency to nicotine, harm to the developing adolescent brain, effects on memory formation, increased cancer risk, asthma exacerbations, respiratory distress, and failure, and increased likelihood of illicit drug use and traditional cigarette use in the future (CDC, 2022). The current literature suggests that parents actively influence adolescent e-cigarette use even when accounting for peer norms and adolescent attitudes, which is why evidence-based education on the health risks associated with e-cigarettes and vaping directed toward parents may help reduce vaping rates among teens (Trucco et al., 2021).

Background Knowledge and Significance

E-cigarettes are electronic devices that heat a liquid containing nicotine and other harmful chemicals, often with sweet flavoring, to produce an aerosol. E-cigarettes can often look like USB flash drives, pens, or traditional cigarettes. E-cigarettes can also deliver marijuana and other drugs (CDC, 2022). Traditional cigarettes, also called combustible cigarettes, are made from tobacco, chemical additives, a filter, and a paper wrapping that is burned, and the smoke is inhaled; this differs from e-cigarettes, in which a chemical liquid is heated to form an aerosol (FDA, 2023). A CDC study found that 99% of the e-cigarettes assessed contained nicotine, even

in products that did not disclose that they contained nicotine, and in some vape liquids that were marketed as containing 0% nicotine (CDC, 2022). JUUL and Puff Bar, two popular brands of e-cigarettes, have incredibly high levels of nicotine. One JUUL pod has the equivalent of one pack, or 20 cigarettes, worth of nicotine (CATCH My Breath, n.d.).

Nicotine dependence, listed in the Diagnostic and Statistical Manual of Mental Disorders Fifth Edition (DSM-V), has a high comorbidity rate with various neuropsychiatric conditions, including mood and anxiety disorders (Jobson et al., 2018). More than 90% of adults who use nicotine started as teenagers, which is concerning from a neuropsychiatric perspective as adolescence is a critical period for neurodevelopment; at this age, the brain is particularly sensitive to the effects of psychostimulant drug exposure (Jobson et al., 2018). Adolescents who show signs and symptoms of nicotine dependence are less likely to report wanting to quit and are also less likely to have attempted to quit within the last year, which shows that nicotine dependence is a significant barrier to the cessation of adolescent e-cigarette use (Case et al., 2018).

The adolescent and young adult brain continues to grow and develop until about 25 years of age (FDA, 2022). Nicotine can cause harm to the brain because it affects the areas that control attention, learning, mood, and impulse control. Each time a new memory or skill is created or learned; a synapse is built between brain cells; nicotine changes how these synapses form (CDC, 2022). Nicotine is much more addictive to the immature teen brain than the developed brain of an adult, making the risk of addiction and resultant withdrawal if vaping were to stop much more significant in adolescents (CATCH My Breath, n.d.). Evidence has also shown nicotine can lead

to attention-deficit hyperactivity disorder-like symptoms and compulsive behavior, which can contribute to challenging classroom and home behaviors (CATCH My Breath, n.d.).

What is possibly more concerning is that current research suggests that vaping as an adolescent increases the future risk of addiction to traditional cigarettes and other drugs (CATCH My Breath, n.d.). A United Kingdom (UK) study of almost 3,000 adolescents aged 13-14 years spanning 20 different schools found that students who reported having ever used e-cigarettes were strongly associated with subsequent initiation and escalation of traditional cigarette use within the next 12 months (Conner et al., 2018). Another study that used data from a nationally representative annual survey Monitoring the Future, looked at the future substance use behaviors of 12th graders who used e-cigarettes. The analysis showed that 18-year-olds who reported e-cigarette use within the last 30 days were more likely to report the use of alcohol, marijuana, and non-medical prescription drugs at 19 years of age (Evans-Polce et al., 2020).

Unfortunately, e-cigarettes are not just harmful for those using them but also for those around them. Children and adults have been poisoned by swallowing, breathing, or absorbing e-cigarette liquid through their skin or eyes (CDC, 2022). Nationally, about 50% of the calls to poison control regarding e-cigarettes are for children five years or less (CDC, 2022). In addition, there have been multiple reports of defective e-cigarettes causing fires and explosions, some of which resulted in serious injuries to the users and bystanders (CDC, 2022). The ingredients in e-cigarettes, such as nicotine, flavorings including diacetyl, volatile organic compounds, heavy metals, and ultrafine particles, can cause significant lung injury when aerosolized and inhaled (Becker & Rice, 2021). Also, the process of heating the e-cigarette nicotine solution produces aldehyde, acetaldehyde, formaldehyde, and acrolein, which are known carcinogens and may

increase the risk of cancer in e-cigarette users and those who inhale their aerosols secondhand (CATCH My Breath, n.d.).

Studies have shown that passive inhalation of e-cigarette aerosols can cause irritation, oxidative stress, inflammation, and impairment of the lung's immune defense against infection, as well as an increased cancer risk due to heavy metal exposures (Fowles et al., 2020; Polosa et al., 2019). Chemicals that are found in e-cigarette aerosols, including cancer-causing alkaloids, have previously been found to have transferred from a vape shop to neighboring businesses in a multiple-tenant retail building (Almeida-da-Silva et al., 2021). Being around those who use e-cigarettes can have associated adverse health risks. One particular risk of e-cigarettes that are being newly researched is third-hand smoke, which is when residue from gases and particles cling to surfaces like clothing, skin, furniture, and floors. Third-hand smoke particularly affects the pediatric population due to crawling, hand-to-mouth exchange, and explorative developmental stages (Almeida-da-Silva et al., 2021). E-cigarettes have been shown to cause third-hand exposure to nicotine that can cause DNA damage and increase the short and long-term risks for health problems like asthma and cancer (Almeida-da-Silva et al., 2021).

Not only are the ingredients commonly used in e-cigarettes carcinogenic and increase the risk of lung cancer, but they also increase the risk of oral cancers (Gordon et al., 2022). E-cigarettes are associated with increased dental cavities, periodontal disease, and mucosal lesions in the mouth (Gordon et al., 2022). Vaping of e-cigarettes has also been associated with elevated rates of chronic obstructive pulmonary disease (COPD) and asthma, with even higher rates in co-users of e-cigarettes and traditional cigarettes. However, the long-term effects of vaping on the lungs have not yet been determined due to the relatively new epidemic of e-cigarette use

(Gordon et al., 2022). The liquid that is used to fill e-cigarettes contains propylene glycol and vitamin E acetate, which are respiratory irritants that were found in bronchoalveolar lavage samples in the outbreak of electronic cigarette and vaping-associated acute lung injury (EVALI) that led to dozens of deaths and thousands of cases of acute respiratory injury and failure in 2019 (Becker & Rice, 2021). There have only been a small number of studies that have focused on the association between cardiovascular disease and e-cigarettes. Still, the early consensus is that there is a greater incidence of adverse cardiovascular outcomes like coronary heart disease, arrhythmias, and myocardial infarction with vaping use (Gordon et al., 2022). E-cigarettes may expose their users to heavy metals from batteries and heating coils that are carcinogenic and possibly toxic; however, the specific long-term effects of these exposures are unclear (Becker & Rice, 2021).

Many parents and adolescents are unaware of the health risks of vaping and instead perceive it as a safer option than traditional cigarettes. Adolescents have reported that they choose to vape, or it is appealing to them because they are easy to access by purchasing them at grocery stores, pharmacies, or gas stations; they are easily concealable; and they come in sweet and fruity flavors (CDC, 2022). A study of US high school seniors identified that the three main motivations to vape were taste and entertainment (63%), experimentation (29%), and to replace traditional cigarettes (7%) (Becker & Rice, 2022). In a study of US and UK adolescents, a common belief reported by the teens was that fruity-flavored e-cigarettes were less harmful than tobacco-flavored ones (Becker & Rice, 2022). In the last decade, there have been many attempts to limit the appealing flavors of the vaping liquid that primarily makes the products aimed at children. In 2020, amid epidemic levels of e-cigarette use among youth, the FDA issued a new

policy prioritizing the enforcement against certain unauthorized flavors that appeal to children, including mint and fruit flavors, but only in closed-system e-liquid cartridges (FDA, 2020). This policy had many loopholes, which allowed sweet and appealing flavors to be continued, but instead, using disposable and refillable cartridges. These are now the two most used delivery methods for e-cigarettes (Truth Initiative, 2020). There is still a great need to limit these sweet flavors, as evidence shows US adolescents reported more interest in trying e-cigarettes if they were flavored like fruit, candy, or menthol (Becker & Rice, 2022). Adolescents whose first e-cigarette exposure was sweet or fruit-flavored progressed to more frequent e-cigarette use faster than peers whose initial exposure was unflavored or tobacco-flavored (Becker & Rice, 2022).

Pediatric primary care providers (PCPs) are uniquely positioned to provide evidence-based education to parents and their adolescents regarding using e-cigarettes and the associated health risks. Rates of e-cigarette use are higher in high school students compared with middle school students, which highlights the need for prevention efforts to start early before children begin the behavior. E-cigarette and tobacco screening is recommended at each annual well-child visit starting at 11 years of age (American Academy of Pediatrics [AAP], 2019). While most youth report that it is essential to talk with their pediatrician about tobacco use, many report not always being given the opportunity to do so (AAP, 2019). Only 39% of adolescents aged 13-18 years had discussed confidentiality with their provider, and only 32% had a private one-on-one component of their office visit (AAP, 2019).

In a study to investigate pediatric PCPs perceptions about e-cigarettes and related clinical practices, providers described topics they felt were important to discuss during health prevention visits (Peterson et al., 2018). These topics included debunking myths, addressing the risks

associated with e-cigarette use, including its potential to be a gateway substance, and emphasizing a lack of regulation of e-cigarettes (Peterson et al., 2018). The providers listed barriers to these educational conversations as lack of medical knowledge, lack of familiarity with slang used and adolescent motivations behind their use, inadequate screening tools, and lack of time (Peterson et al., 2018). The US Preventive Services Task Force (USPSTF) released an updated recommendation statement regarding interventions for the prevention and cessation of tobacco in children and adolescents within the primary care setting. This updated recommendation states with moderate certainty that primary care behavioral interventions, including education or brief counseling, should be used to prevent tobacco use in school-aged children and adolescents (USPSTF, 2020).

CATCH My Breath is an evidence-based nicotine vaping prevention program for youth in grades 5-12 that has been shown to reduce middle school students' likelihood of vaping substantially (Baker et al., 2022). It was developed by The University of Texas Health Science Center at Houston School of Public Health and works to provide grade-level specific education. A peer-reviewed study of CATCH My Breath found that students in schools implementing the program were half as likely to experiment with e-cigarettes over the next 16 months compared with those who did not receive the program (Kelder et al., 2020). CATCH My Breath has since released community support resources, guides for health care providers, and a step-by-step, evidence-based toolkit for parents that can be distributed during pediatric annual well-child visits (CATCH My Breath, n.d.). This toolkit for parents helps provide easy-to-understand information about e-cigarettes and vaping. It also offers guidance on how to speak to their child about e-

cigarettes with the comfort of having evidence-based resources available for support through the toolkit and online with age-specific content (CATCH My Breath, n.d.).

Local Problem

Adolescent vaping and nicotine addiction via e-cigarettes is not only a national issue but also a local one. The number of adolescents in Arizona who report using e-cigarettes is more than double that of traditional cigarettes (AZCJC, 2021). Every two years, the Arizona Youth Survey (AYS) is administered statewide to samples of 8th, 10th, and 12th graders under the direction of the Arizona Criminal Justice Commission Statistical Analysis Center (AZCJC). For the state of Arizona in 2018, 37.1% of the students reported using e-cigarettes in their lifetime, with 19.9% having used them within the past 30 days. However, in 2022, rates decreased, with 18.9% of students reporting using e-cigarettes and 9.6% reporting having used e-cigarettes within the last 30 days (AZCJC, 2022). Although the self-reported rates of e-cigarette use have decreased from 2018 to 2022 in Arizona, these statistics are still alarming. The COVID-19 pandemic possibly influenced the drop in self-reported rates. The results from a national online survey of adolescents and young adults showed that 32.4% quit and 35.3% reduced the amount they used before May 2020 (Gaiha et al., 2020). The primary reasons reported for these changes in usage were being unable to go to vape shops during COVID-related shelter-in-place orders and product unavailability (Gaiha et al., 2020).

Banner Health Center in Queen Creek, Arizona, does not consistently screen for electronic cigarette use during well-child adolescent visits; this is a provider-specific decision. Reasons cited include insufficient time during the visit, no easily accessible validated screening tools, and a desire to keep a trusting relationship with adolescent patients and their parents with

the fear that discussions about e-cigarette use may turn people off. This site also has no specific educational materials to provide teens and their parents with information about e-cigarettes or available resources. Providers voiced that they felt many parents do not read educational materials handed out at visits unless they are specifically discussed at the patient visit.

Intended Improvement

Project Purpose

This quality improvement (QI) project aimed to provide parents of adolescents aged 11-14 years with the CATCH My Breath parental toolkit handout to increase their knowledge of e-cigarette health risks and assess their intention to initiate conversations regarding the risks of e-cigarettes.

Project Question

Does an evidence-based educational handout and presentation for parents of adolescents aged 11-14 years at Banner Health Center in Queen Creek using the CATCH My Breath initiative increase their knowledge of the health risks associated with electronic cigarettes?

Project Objectives | Aims

- Aim 1: Assess parental knowledge of the health risks and prevention techniques for adolescent e-cigarette use via a pre-educational survey.
- Aim 2: Provide parents of adolescents aged 11-14 years with the CATCH My Breath evidence-based educational parental toolkit handout on e-cigarettes at well-child visits.

- Aim 3: Assess parental knowledge of the health risks and prevention techniques for e-cigarette use after reading the educational toolkit handout via a post-educational survey.
- Aim 4: Compile and analyze the data to determine if a statistically significant change in parental knowledge occurred after viewing the educational toolkit handout and provide a copy of the results to Banner Health Center at Queen Creek.

Theoretical Framework

Successful creation and implementation of a quality improvement project relies on a theoretical framework. The Health Belief Model (HBM), developed in the 1950s-60s by social psychologists, hypothesizes that health-related behaviors depend on various factors. The HBM was one of the first models to adapt theory from the behavioral sciences and apply it to health problems. The six defined themes are perceived susceptibility, severity, benefits of taking action, barriers to taking action, cues to action, and self-efficacy (Rosenstock, 1974; Rosenstock et al., 1988). Perceived susceptibility is an individual's opinion of the chances of contracting an illness or being in a specific health situation. Perceived severity is an individual's opinion of how serious a condition or situation is and what the consequences may be. Perceived benefits refer to the belief in the success of the recommended health behavior and if it is likely to be beneficial. Perceived barriers are the perception of cost associated with following the recommended health behavior. Cues to action attract the individual to make a change, whether internal or external. Finally, self-efficacy refers to the level of confidence in one's ability to perform the recommended health behavior (Rosenstock, 1974; Rosenstock et al., 1988). Those with low self-efficacy will have less self-confidence in their ability, which will influence the likelihood of the

behavior being performed. The HBM has been applied to various health behaviors and populations, particularly preventive behaviors (Sutton, 2001).

The six factors that make up the HBM create a balance of wanting to adopt a change or intervention versus an unwillingness to want to change. By manipulating the six variables, it is possible to modify one's intention to change (Rosenstock et al., 1988). With education, an individual's perceived susceptibility and severity of the illness or health situation can be modified, and the perceived benefit of the health behavior recommendation can also improve (Sutton, 2001). A health care provider educating a patient or parent creates a cue to action, and a provider can improve the self-efficacy of the patient or parent through continued visits with positive reinforcement and encouragement.

The HBM was applied to this quality improvement project to provide a framework for successful planning and implementation of education on e-cigarettes to parents of adolescents (see Figure 1). By educating parents on the rates of adolescents using e-cigarettes in their lifetime and within the last 30 days, parents can better understand how common it is and that their adolescent is susceptible to e-cigarette use (perceived susceptibility). Teaching the parents of adolescents about the significant mental and physical health risks of e-cigarette use can increase their perception of the severity of e-cigarette use, which can positively impact their desire to influence the health behaviors of their children regarding e-cigarettes and vaping. The benefits of education were reinforced with parents, including the importance of having discussions with their adolescents about e-cigarettes, decreased initiation rates of vaping, decreased likelihood of traditional cigarette use, and decreased risk for health complications. Barriers like peer pressure and sweet e-cigarette flavorings can attempt to be minimized through

federal and state legislation and school-based education. Parents need cues to action, starting at the adolescent's annual well-child visit. The CATCH My Breath parental toolkit gave parents an external cue to action. At the annual well-child visits, pediatric primary care providers can provide positive reinforcement, support, and other resources to increase self-efficacy among the parents and increase their intentions to discuss e-cigarettes and their health risks with their children. These discussions also have the potential to positively impact the parents' health behaviors, primarily if the parents use e-cigarettes or vaping products and wish to quit to reduce the risk of exposure and health risks to their children.

Figure 1

Application of The Health Belief Model

A potential barrier to this theory was educating parents or family members who use traditional cigarettes or e-cigarettes, as they may have been more likely to resist educational

interventions and voice prevention rhetoric to their adolescents. The CATCH My Breath parental toolkit, as seen in Appendix E, includes specific guidance for parents discussing e-cigarettes with their teens. The toolkit explains that parents should continue to reinforce that smoking or vaping is dangerous, but specifically for children. Parents should explain that tobacco products are illegal for anyone under 21 years of age to protect them because nicotine can negatively affect the developing brain. It also encourages parents to explain that once the habit is started, it is very challenging to stop, and if they could go back in time, they would never have started the habit in the first place. The perceived benefits were emphasized with these parents, and tools to improve self-efficacy were focused more heavily on increasing the parents' drive to discuss e-cigarettes with their adolescents, even though it may be a slightly uncomfortable discussion.

Major Concepts Defined

Parent

For this quality improvement project, the term parent is defined as anyone who is the child's caregiver, including biological and legal guardians.

Adolescent

For this quality improvement project, adolescents are defined as 11-17 years of age. Those 18 years of age and older are considered adults and are not considered adolescents for this project.

Electronic Cigarette/Vaping

Electronic cigarettes (e-cigarettes) are electronic devices that deliver tobacco, nicotine, or marijuana products via aerosolization. Vaping is defined as the act of using an e-cigarette.

Literature Synthesis

Evidence Search

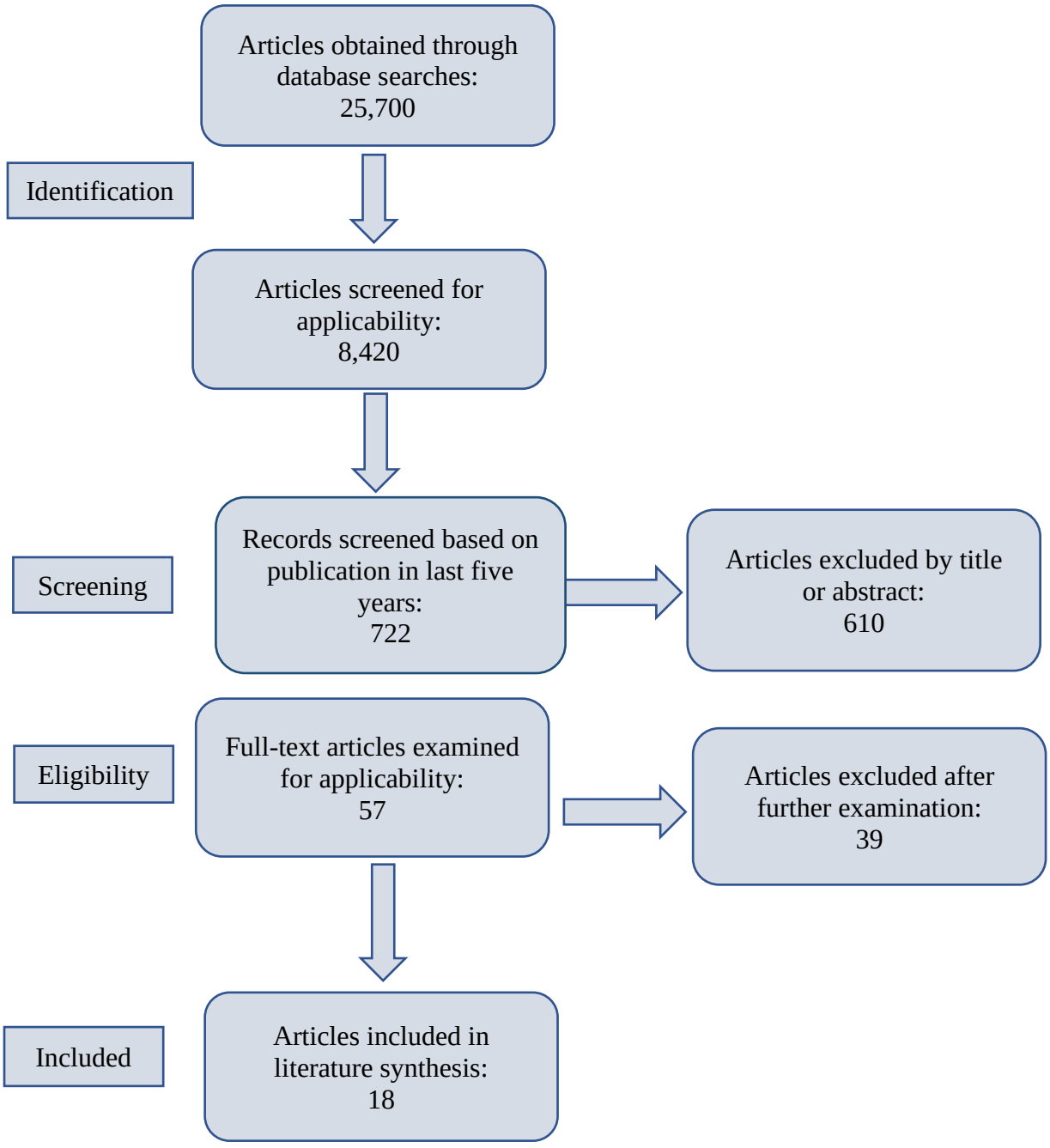
A literature search was conducted to identify evidence regarding the education of parents of adolescents on the health risks of e-cigarettes. The three scholarly databases used for the search were Google Scholar, PubMed, and Cumulative Index of Nursing and Allied Health (CINAHL). Search filters were applied to ensure applicable results; articles were excluded if they were not written in English or published within the last five years, no abstract was available, or the entire article was not available for viewing.

The reviewed articles came from all three databases mentioned above. Search terms included the following key words and phrases that were combined via Boolean operators: (“adolescents” OR “adolescence” OR “teenagers” OR “teens” OR “youth” OR “young adult”) AND (“electronic cigarettes” OR “e-cigarettes” OR “vape” OR “vaping”) AND (“health risks” OR “dangers” OR “effects”). In addition to the previously mentioned keywords and phrases, additional searches were made (1) adding AND (“primary care providers” OR “practitioners” OR “doctors” OR “PCP”); or (2) adding AND (“parent” OR “parental”) AND (“education” OR “educational” OR “program”). Available article results varied from approximately seven articles up to 17,200 depending on the search engine, available search filters, and keywords/search terms used. Articles were then reviewed for alignment with the project topic and were excluded based on the title and abstract not containing the required content for this project. After all articles were screened for inclusion or exclusion based on the criteria above, the remaining number of articles used in this literature synthesis was 18. See Figure 2 for the evidence search flow diagram. The key themes identified in the review of literature were the health risks of e-cigarettes, the need for

parental involvement, and education in primary care. See Appendix H for the literature grid and summary of the selected articles for this QI project.

Figure 2

Flow Diagram of Evidence Search



Comprehensive Appraisal of Evidence

Health Risks of Electronic Cigarettes

E-cigarettes can cause many mental and physical health problems in adolescents, some of which are still being researched and determined due to the relatively recent vaping epidemic. E-cigarettes contain toxic chemicals and carcinogens, including nicotine, formaldehyde, diacetyl, and heavy metals, placing adolescents at high risk for health problems (Gordon et al., 2022; Overbeek et al., 2020). Some ingredients are carcinogenic and increase the risk of future cancer development (Gordon et al., 2022). Nicotine affects the immature and developing brain through altered synapses and memory formation, and it causes sleep disturbances that can worsen adolescent behavior and school performance due to adolescent sensitivity to psychostimulants (CDC, 2022; Jobson et al., 2018). Nicotine can also cause behavioral changes and challenges, increase the risk for neuropsychiatric conditions like mood and anxiety disorders, and perpetuate poor decision-making, as seen through an increased risk of future traditional cigarettes, marijuana, alcohol, and non-prescription drug use (Conner et al, 2018; Evans-Polce et al., 2020; Gordon et al., 2022; Jobson et al., 2018; Overbeek et al., 2020).

E-cigarettes also pose serious physical health risks. E-cigarette use in adolescents can cause e-cigarette, or vaping, product use-associated lung injury (EVALI), which can be life-threatening (Becker & Rice, 2021; Overbeek et al., 2020). Adolescents with EVALI can have severe symptoms, including the need for hospital admission, mechanical ventilation in the intensive care unit, and increased risk of death (Becker & Rice, 2021; Overbeek et al., 2020). Other respiratory risks with e-cigarette use include increased frequency of asthma exacerbations, increased respiratory illnesses like bronchitis, and overall pulmonary inflammation and lung

injury caused by inhaled aerosolized toxic and irritating ingredients (Becker & Rice, 2021; Overbeek et al., 2020). Additionally, e-cigarette use increases the risk for cardiovascular symptoms and events like chest pain, arrhythmias, coronary artery disease, and myocardial infarctions (Gordon et al., 2022; Overbeek et al., 2020).

Need for Primary Care Education with Parental Involvement

The US Surgeon General declared electronic cigarette use an epidemic in 2018 (CDC, 2020). Pediatric primary care providers (PCPs) are uniquely positioned to address the physical and mental health risks of vaping at annual well-child health maintenance visits with the parent and the adolescent. Both adolescents and parents self-report a lack of knowledge of e-cigarettes and their associated health risks. Many adolescents believe that e-cigarettes are not as dangerous as traditional cigarettes and that fruit-flavored e-cigarettes are less harmful than the menthol or tobacco flavors (Becker & Rice, 2021; Cohen et al., 2022). The inclusion of parents in educating children and adolescents on the health risks of e-cigarettes is crucial because the current literature suggests that adolescent perceptions of parental knowledge of e-cigarettes and higher perceptions of parental engagement and knowledge of their child's location, activities, and peer groups reduced the risk for adolescent initiation of vaping (Mantey et al., 2022). The AAP recommends that pediatric PCPs start screening for e-cigarette use, provide education on risk factors, and provide counseling for the parents and child annually starting at age 11 years (AAP, 2019). However, many adolescents report being unable to address this topic with their PCP (AAP, 2019). PCPs are in a suitable position to help close the large gap in knowledge on e-cigarette content and safety profiles for both adolescents and parents.

Education Techniques

An effective way to improve adolescent and parental knowledge of e-cigarette health risks is with specifically targeted evidence-based techniques and materials. The USPSTF recommends primary care clinicians provide interventions, including education and brief counseling, to prevent the initiation of tobacco use (UPSTF, 2020). Other recommendations include educating clinicians to help them feel more prepared to discuss e-cigarettes with their patients (Peterson et al., 2018). Widespread education about the dangers of second and third-hand e-cigarette exposure is vital, especially for the pediatric population (Fowles et al., 2020; Almeida-da-Silva et al., 2021). Fowles et al. (2020) concluded that e-cigarette designs of heating elements appear to be the primary source of heavy metals in e-cigarette aerosols. There is a significant need for product design modifications, enforced product safety regulations, and quality control of manufacturing. Due to the dangers of e-cigarettes and vaping in adolescents, the AAP recommends annual screening for e-cigarette use starting at 11 years of age through a private and confidential conversation. However, the specifics of what education and counseling are recommended at annual well visits are vague, and there are limited resources for clinicians on what educational resources are evidence-based.

One educational resource available is CATCH My Breath, an evidence-based youth nicotine vaping prevention program for children in grades 5-12 that substantially reduces students' likelihood of vaping (Baker et al., 2022). This program has a toolkit for parents, including an informational handout about the basics of e-cigarettes and vaping. The CATCH My Breath program for children, was initially developed for use in schools; however, the parental toolkit is a separate resource that can easily be translated for use during well-child visits in the

pediatric primary care setting, as seen in Appendix E. The parental toolkit packet is just a few pages long, which allows it to be completed in a timely manner, with some parts of the toolkit being sent home with the parent to be completed after the well-child visit. By involving the parents, the adolescent's perception of parental knowledge should increase, and it should result in the active engagement of the parent, which should decrease the likelihood of e-cigarette use by the adolescent (Trucco et al., 2021; Mantey et al., 2022). CATCH My Breath is available in multiple languages and is a way for parents to learn more about the vaping epidemic, gauge their child's risk of trying e-cigarettes, and determine the best way for the parent to approach a discussion with their child about e-cigarettes and the associated health risks (CATCH My Breath, n.d.).

CATCH My Breath's parental online toolkit has optional interactive videos and a handout (Appendix E). These videos go step by step through the process of educating parents on (1) generalized information on the youth vaping epidemic, (2) checking in with their adolescent to ensure they are making healthy decisions, (3) learning common signs of vaping and nicotine addiction and how to identify vaping products, (4) common roadblocks to having a discussion about tobacco and vaping and why it is so important, and (5) practical tips on talking with their adolescent about vaping, including examples of tough questions their child might ask (CATCH My Breath, n.d.). The toolkit also includes available community resources and how to sign their child up for the full CATCH My Breath curriculum. Students in schools that implemented the CATCH My Breath educational curriculum were half as likely to experiment with e-cigarettes over the next 16 months (Kelder et al., 2020). The current research shows that CATCH My Breath has proven to be an effective tool in educating adolescents on the health risks of e-

cigarette use, and it provides resources for parents to improve their knowledge of e-cigarettes and guide discussions with their children. Parents exposed to the CATCH My Breath content in the pediatric primary care setting may utilize the online resources for themselves and their children after the well-child visit, and they can even encourage school-based adoption of the evidence-based curriculum for more widespread education on the associated health risks of e-cigarettes.

Strengths of Evidence

The articles in this literature synthesis included a variety of research study designs. One randomized control trial provided the most reliable evidence of the efficacy of a specific intervention. Two cohort studies follow a group of people to track risk factors and outcomes over time. There were two quasi-experimental studies, which were non-randomly assigned groups that received either a placebo or intervention. One qualitative structured interview study pulled together opinions from a group of clinicians. There were six evidence reviews, which are in-depth but not entirely exhaustive, reviews of current research to help summarize and understand different topic components, and one systematic review. Finally, five cross-sectional studies assessed the prevalence of an outcome for a population at one specific time.

One strength in this review of the current literature on e-cigarettes was that all 18 articles provided evidence of e-cigarette use's health risks and consequences. Another strength of this literature review was that several articles supported the role of the primary care provider in providing parental education on the risks of e-cigarette use (AAP, 2019). Multiple studies had large sample sizes, with a few including national surveys. Various articles were conducted in the educational setting, as well as in the healthcare setting. Many studies were completed

anonymously to promote honest answers by adolescent participants. The evidence provided clear information on the need for parental involvement and the impact parents can have on diverting risky adolescent behavior like vaping. The evidence connected the need for education on e-cigarettes in the pediatric primary care setting and the significant health risks associated with their use. This review of current literature delivered high-quality evidence that promoted education on the health risks of e-cigarette use and emphasized the importance of prevention starting in the pediatric primary care setting.

Weaknesses of Evidence

Weaknesses of this literature review included limited inclusion of randomized-controlled trials and systematic reviews centered on ways to minimize and prevent e-cigarette use among adolescents. Multiple articles also had relatively small sample sizes. The CATCH My Breath campaign targets education in the schools but not the health care setting. However, the parental toolkit information is valuable and easily applicable in the healthcare setting with minimal addition to the health care practitioner's appointment time. The e-cigarette epidemic is relatively recent among adolescents, contributing to the limited evidence. Also, performing research studies in the pediatric population poses challenges due to the increased restrictions and difficulty in recruiting participants. While randomized controlled trials and systematic reviews are often crucial for evidence-based practice, much of the evidence gathered for this review utilized data review and statistical analysis that could still deliver cohesive and informative guidance on the use of e-cigarettes by adolescents and the associated health risks.

Gaps and Limitations

This literature review illuminated the significant need for high-quality studies on adolescent e-cigarette use and prevention. Despite the past and current evidence showing the lack of parental knowledge of e-cigarettes and their health risks, there are still no clear and detailed clinical practice guidelines for primary care providers. The literature has also not been able to determine when and how this education is best received by parents and disseminated to their adolescents. There is a need for higher-quality evidence that guides prevention methods, including more evidence-based educational-related materials. While self-reports of adolescent e-cigarette use show that the rates have declined slightly in the past few years, there are still significant levels of adolescent e-cigarette use that are concerning. More research on evidence-based guidelines for pediatric primary care providers is needed to educate parents and adolescents on e-cigarettes.

METHODS

Project Design

The quality improvement (QI) project provided parents of adolescents with CATCH My Breath's evidence-based parental educational toolkit. It assessed parental knowledge of e-cigarettes and vaping using pre- and post-educational surveys. Parents of adolescents aged 11-14 years were given an 11-item survey before the annual well-child visit. During the health supervision visit, the CATCH My Breath toolkit handout was presented to the parent and reviewed by the DNP student. After the brief educational intervention, the parent completed a 10-item post-educational survey to evaluate what knowledge was attained during the educational

session with the evidence-based educational tool, their satisfaction with the educational session, and recommendations for improvement.

Model for Implementation

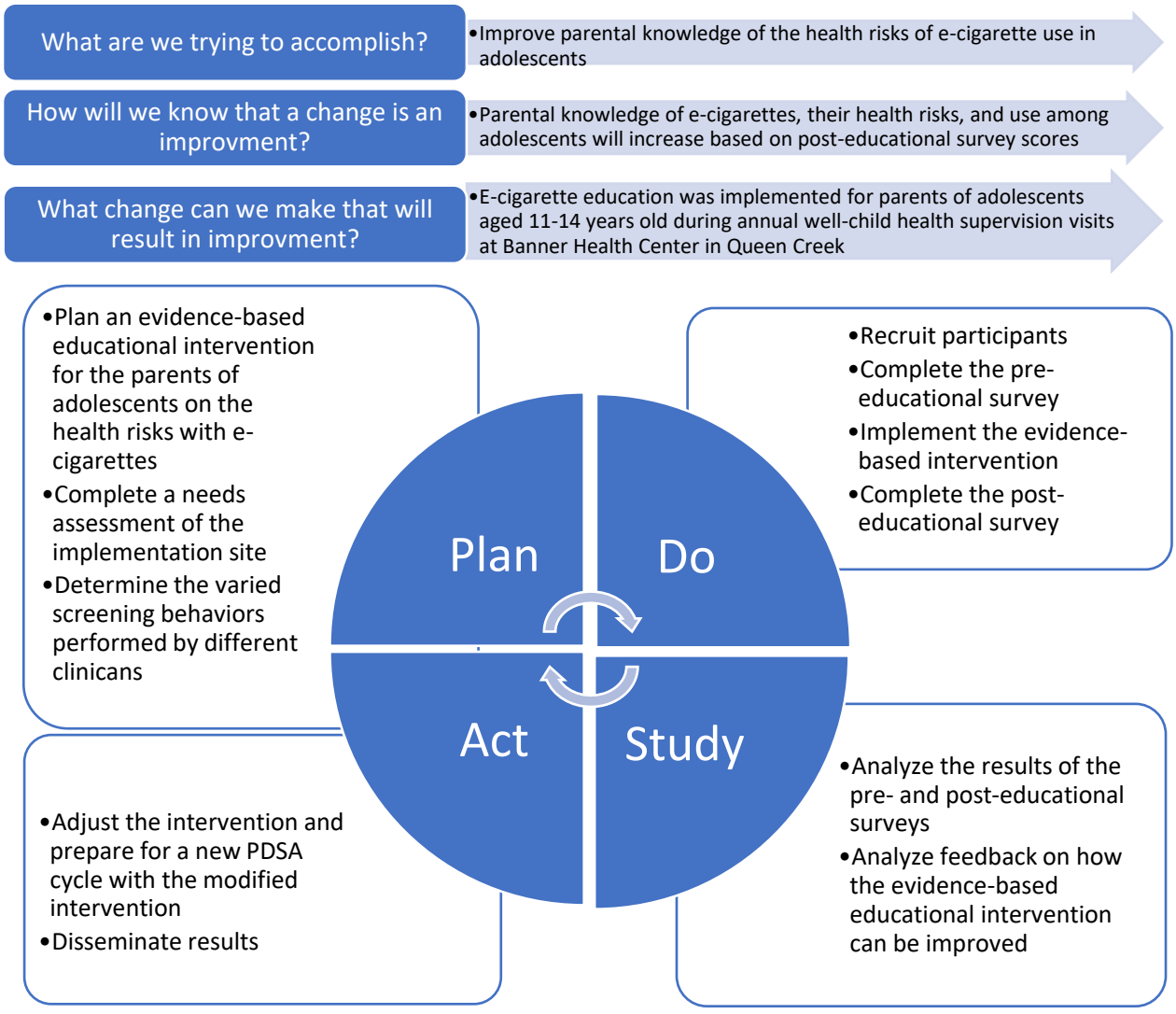
The Plan-Do-Study-Act (PDSA) model, created by the Institute for Healthcare Improvement (IHI), was used to develop and implement this QI project in the pediatric primary care setting. The PDSA model proposes three questions, as seen in Figure 3, to help determine the parameters of the project: what are we trying to accomplish, how will we know that a change is an improvement, and what change can we make that will result in an improvement (IHI, 2022)? The PDSA model involves four steps: planning the intervention (plan), which includes how data will be collected; implementing the change (do); studying the results of the intervention (study); and acting on how the intervention can be modified for the future (act) (IHI, 2022). Typically, multiple PDSA cycles are completed for an intervention. However, for purposes of this DNP project, only one PDSA cycle was completed. See Figure 3 for a depiction of how the PDSA model was used to guide the development and implementation of this project.

The DNP project was intended to improve parental knowledge of e-cigarettes, including their associated health risks. An improvement in knowledge was determined by an increase in score from the pre- to the post-educational survey. The planned intervention for this PDSA cycle was the administration of the parental toolkit handout from CATCH My Breath to parents of adolescents aged 11-14 years at Banner Health Center in Queen Creek during well-child visits. Parents of the selected adolescents completed a pre-educational survey before the evidence-based handout and presentation delivery. After the intervention, parents completed a post-educational survey. The results of the surveys were analyzed and summarized to determine if a

statistically significant change in parental knowledge resulted from the educational intervention. The data and summarized results were presented to the primary stakeholders at Banner Health Center in Queen Creek. Based on the results of each cycle, modifications to the intervention can be made (if necessary), which can then be used in the next PDSA cycle.

Figure 3

Plan-Do-Study-Act (PDSA) Model



Setting and Stakeholders

This DNP project was implemented in the Banner Health Center at Queen Creek primary care setting with English-speaking parents of adolescents aged 11-14 years. The stakeholders involved in the QI project included the practice owners, the pediatric health care providers, the parents of the adolescents, and the adolescents themselves. This DNP project was a low-risk intervention for the primary care clinic providers and office staff as it did not require any extra time or effort on their part. However, there was a potential risk to the office and medical staff that there may be workflow interruptions or prolonged patient care times due to the DNP student implementing the project with the parents of age-eligible adolescents. Potential benefits to providers and office staff included increased evidence-based patient care provided to parents, which can subsequently improve patient outcomes and an enhanced provider-parent/patient relationship. A potential risk to patients and their parents included an increased appointment time associated with receiving evidence-based education and completing pre- and post-educational surveys. Potential benefits to the parents included increased knowledge of e-cigarettes, vaping, associated health risks, and what resources are available to them. They may also experience an enhanced provider-parent relationship and feel more comfortable reaching out for support and help in the future. Although the adolescents were not active participants in this DNP project, they may have been indirectly affected through parental education on e-cigarettes, their health risks, and the importance of discussing this topic with their adolescent child. This project could have positively impacted the adolescents by helping them make informed, health-conscious decisions about e-cigarette use in the future.

Planning the Intervention

Parents of adolescents aged 11-14 years who presented for their annual well-child visit and agreed to participate in the QI project were given a pre-education survey via a QR code to complete anonymously and electronically. After completing the survey, the parents received evidence-based education on e-cigarettes via the CATCH My Breath parental toolkit educational handout, as found in Appendix E. The details of the educational handout were explained to the parents by the DNP student in a 5–10-minute face-to-face session, and all parental questions were answered. Information about the associated health risks of e-cigarettes in adolescents was emphasized throughout the educational session. Please see Appendix F for a full script of the educational session between the DNP student and parents. Immediately after the educational materials were discussed, parents completed the post-educational survey electronically via a QR code to determine if the educational intervention produced a statistically significant change in knowledge. In addition to the knowledge-based questions, the post-educational survey also assessed parental satisfaction with the educational session and recommendations for improving the educational session. The DNP student asked the parents if they had any remaining questions before leaving the room. The parent was sent home with the toolkit handout (Appendix E) and was encouraged to direct any future questions about e-cigarettes and vaping to their child's primary care provider at subsequent healthcare visits.

Parental knowledge was assessed using the pre- and post-educational survey scores. The surveys were provided via QR codes linked to a Microsoft Teams form. If the parents did not have a personal device that could be utilized for this, they were excluded from the project. All results were analyzed after the completion of the QI project. Data was de-identified by utilizing a

unique personal identifier that participants included on the pre- and post-educational surveys. This identifier was the participant's mother's initials followed by the numeric month she was born (example: "LC04"). This unique identifier was utilized to align the pre- and post-educational surveys of the respondents. The surveys were anonymous and did not require any personal identifying information from the participants.

Participants and Recruitment

A convenience sample of parents of adolescents aged 11-14 years was recruited from the pediatric primary care clinic at Banner Health Center at Queen Creek for participation in this QI project. Parents of adolescents aged 11-14 years who presented for a well-child check were shown the recruitment flyer by the front desk or medical assistant (MA) staff and asked if they would like to participate. The recruitment flyer was presented to the parents during the rooming process to explain the project's purpose and participation benefits. Inclusion criteria included: (1) a parent of an adolescent aged 11-14 years, (2) presenting for a well-child visit, (3) English speaking, and (4) having a compatible personal electronic device to complete the pre- and post-educational surveys via QR codes. Exclusion criteria included: (1) parent of a child younger than 11 years or older than 14 years of age, (2) presenting for an acute or episodic visit, (3) non-English speaking, and (4) not having a compatible personal electronic device to complete the pre- and post-educational surveys via a QR code. The DNP student asked all eligible parents of adolescents at health supervision visits for their desire to participate in this QI project. Parents were given a disclosure form to review before agreeing or disagreeing to participate. The goal of this project was to recruit at least 10 participants.

Consent and Ethical Considerations

Parents of adolescents aged 11-14 years attending their well-child visits received the disclosure (consent) form and recruitment flyer with the QI project details. Parents were notified of the project's intention via the flyer before gaining consent. The participation of parents in this DNP project was strictly voluntary. The boundaries of consent were explained to all individuals, and permission was assumed on completion of the pre-educational survey, educational intervention, and post-educational survey. All baseline information collected was only used to describe the sample for this QI project. Precautions were made to ensure all personal information, like demographics, were de-identified and stored on a database that was password protected and only accessible to the DNP student via the secure Banner Health employee Microsoft Teams log-in. No personal identifiers such as names, addresses, phone numbers, or emails were included in this project. All participants were treated equally, and no compensation was given to the participants. Whether or not the parent wanted to participate in his QI project did not affect the medical care provided to them or their adolescent. Participants were notified that they could withdraw their consent to participate without repercussion.

There were no known conflicts of interest related to this QI project. Permission from Banner Health Center in Queen Creek was obtained, and the project was submitted to Banner Health’s Research Determination Committee, with approval granted before implementation. The project did not include pediatric patients or any other vulnerable populations. This QI project was directed solely at adult caregivers or parents of adolescents, although adolescents may have indirectly benefited from the knowledge gained by their parents. After the data analysis, all data

was removed from the DNP student's computer and Banner Health employee's Microsoft Teams account.

Timeline

A timeline was created to ensure proper progression and timely completion of this DNP project, including establishing dates for the planning, pre-implementation, implementation, and evaluation phases. See Appendix G for the complete timeline for this DNP project.

Data Collection

Data was collected through pre- and post-educational surveys that were completed immediately before and after the administration of the CATCH My Breath educational intervention. This project's implementation and data collection phase was conducted over 12 days to reach the desired number of participants. The Microsoft Teams form results were downloaded into a Microsoft Excel spreadsheet available only to the DNP student on the student's private, password-protected laptop with a secure log-in via Banner Health's dual authentication application. The data was deleted from this laptop, and the DNP student's employee Banner Health Microsoft Teams account after the conclusion of the data analysis. Per the University of Arizona data policy, the project data was transferred to the University of Arizona College of Nursing's secure cloud storage, which will be stored for the next six years.

Participants completed the 11-item pre- and 10-item post-educational surveys (Appendix D) that consisted of the same eight knowledge-based multiple-choice questions. The pre-educational survey also included three baseline questions that allowed for a description of the participant sample population: (1) Have you ever received education about e-cigarettes or vaping in the past?; (2) Have you ever had conversations with your adolescent about e-cigarette use and

their risks?; and (3) Does anyone in the household smoke or vape? The post-educational survey did not include these baseline questions. Still, it did include two additional questions assessing (1) parental satisfaction with the educational materials provided and (2) possible ways to improve the QI project intervention for the future. The knowledge-based questions on the pre- and post-educational surveys and the two short answer questions on the post-educational survey were drawn from a prior DNP student project; credit for the questions on these surveys, excluding the three baseline questions on the pre-survey (which were added specifically for this DNP project), is given to Dr. Melyssa Carlson from her DNP project completed through the University of Arizona College of Nursing in 2022. The questions on these surveys were evaluated by two content experts for their accuracy and applicability in assessing parental knowledge of e-cigarettes for Dr. Carlson's project. An additional expert review was completed by a pediatrician (Appendix I) to ensure the accuracy and applicability of Dr. Carlson's pre- and post-educational survey questions to the educational intervention developed for this DNP project.

Data Analysis

The pre- and post-educational survey data was analyzed through Microsoft Excel on the DNP student's private and password-protected laptop. The data on Microsoft Teams was secured via Banner Health's employee dual authentication application. All surveys were destroyed after data entry and analysis were complete. A paired t-test was used to determine the change in parental knowledge of e-cigarettes and their associated health risks between the pre- and post-educational surveys. This project's statistical significance level was defined as $p<0.05$. The two open-ended questions that included the opinions from the participants about their satisfaction

with the educational materials and ways to improve the QI project in the future had themes derived from the answers summarized within the results.

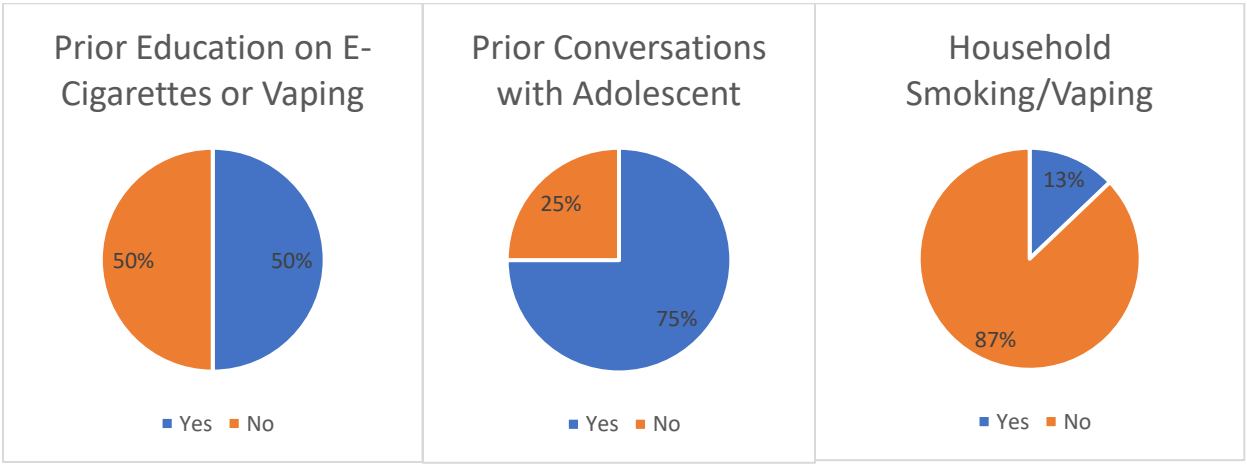
RESULTS

Characteristics of the Sample Population

Eight eligible parents participated in the CATCH My Breath educational session and completed both the pre-educational and post-educational surveys. 50% (n=4) reported they had never received education about e-cigarettes or vaping in the past, and 50% (n=4) reported that they had. 25% (n=2) of participants reported that they had never had a conversation with their adolescent about e-cigarette use and their risk, with 75% (n=6) of parents reporting that they had. 87% (n=7) of parents reported that no one in the household smokes or vapes, while 13% (n=1) reported that someone in the household smokes or vapes. See Figure 4 for participant demographics.

Figure 4

Patient Demographics



Outcomes

Eight educational sessions took place using the CATCH My Breath parental toolkit between August 28, 2023, and September 28, 2023. All participating parents (n=8) completed both the pre-educational and post-educational surveys without any missing questions using their devices and provided QR codes. The data collected was unidentifiable and was exported to Excel on September 28, 2023. Eight multiple-choice content-based questions were identical on the pre- and post-educational surveys. The assessment questions focused on the parents' knowledge of e-cigarettes, their associated health risks, and discussing this topic with their adolescents. This project aimed to improve parental knowledge of e-cigarettes and their associated health risks through the in-person educational session and accompanying toolkit handout.

The participant scores showed a statistically significant increase in knowledge between the pre- and post-educational surveys. The lowest score on the pre-educational survey was two correct, and the highest score was six correct, with an average score of 3.625 questions correct. The post-educational survey had a low score of five correct, a high score of eight correct, and an average score of 6.875 correct answers. The mean and standard deviations were also calculated for the pre- and post-educational surveys. The mean on the pre-educational survey was 3.625 or 45.31% and increased to 6.875 or 85.94% on the post-educational survey. The standard deviation on the pre-educational survey was 19.97%, and 12.39% on the post-educational survey. See Table 1 for a comparison of the descriptive statistics between the pre- and post-educational surveys. The p-value was 0.000182, less than 0.05, showing statistical significance.

Table 1

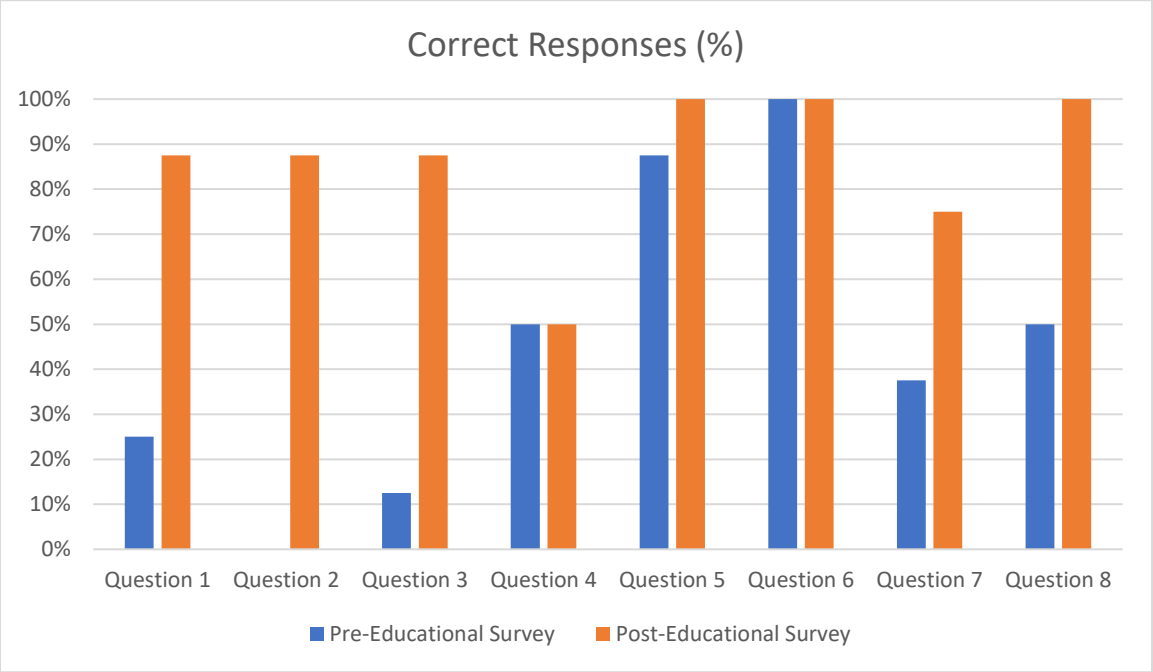
Pre- and Post-Educational Survey Descriptive Statistics

Survey	Number of Participants	Minimum Score	Maximum Score	Mean	Standard Deviation	P-Value
Pre-Educational	8	2/8 (25%)	5/8 (62.5%)	3.625/8 (45.31%)	19.97%	P=0.000182
Post-Educational	8	5/8 (62.5%)	8/8 (100%)	6.875/8 (85.94%)	12.39%	

After the educational intervention, the improvement in parental knowledge became clear by comparing correct responses to each question between the pre- and post-educational surveys. All participants increased their scores from the pre- to the post-educational survey. No participants had a decrease in survey scores. The most missed questions on the pre-educational survey were questions 2 and 3, with zero correct answers for question 2 and only one correct answer for question 3. Question 2 asked, "Electronic cigarettes can be shaped like which of the following?" with the most common answer of a gum package (incorrect). Question 3 asked, "This many high schoolers report current use of electronic cigarettes," with the most common answers of 1 in 20 or 1 in 10 (both incorrect). Question 6, which asked "one sign of electronic cigarette addiction is," received 100% of the correct answer on both the pre- and post-educational surveys, indicating that participants came in with the knowledge that nicotine can make someone feel anxious or irritable. Question 4, "Electronic cigarettes contain this cancer-causing ingredient," was the only question to perform poorly with no increase in score from the pre-educational survey (50% correct) to the post-educational survey (50% correct). However, participants changed their answers on this question, with some going from one incorrect answer to another. See Figure 5 for a graphic of the comparison in scores from the pre- to the post-educational surveys broken down by question.

Figure 5

Pre- and Post-Educational Survey Results



The post-educational survey contained two open-ended questions that asked the participants to explain how satisfied or unsatisfied they were with the educational session and offer suggestions for improvement. The most common answers to the first feedback question were “very satisfied” and “satisfied.” The second feedback question was primarily answered with “none” or “N/A,” with one answer of “have the child take the survey as well.”

The paired t-test analysis showed a statistically significant improvement in scores from the pre- to the post-educational survey. There was a 40.63% improvement in participant test scores from the pre- and post-educational survey (95% confidence interval 27.23, 54.02; p=0.000182) after receiving an educational session using the CATCH My Breath parental toolkit. A p-value of <0.05 was used to determine statistical significance, with an actual p-value of 0.000182. See Table 2 for the results of the paired t-test.

Table 2

Results of Paired T-test

Increase in Scores	95% CI Lower	95% CI Upper	P-Value
40.63%	-54.02	-27.23	P=0.000182

DISCUSSION

Summary

This QI project aimed to improve parental knowledge of e-cigarettes and their associated health risks in parents of adolescents 11-14 years of age. An evidence-based CATCH My Breath parental toolkit was distributed, providing educational information on e-cigarettes, their health risks, and ways to talk to adolescents about vaping. The handout also included ways to identify e-cigarettes, signs, and symptoms of their child vaping, and good prevention tactics to teach adolescents to avoid and get out of bad situations involving getting offered nicotine products. The DNP student conducted a 5–10-minute educational presentation reviewing the handout with the parents and answering any questions. This intervention was completed with eight participants who were parents of adolescents attending their well-child visits at the Banner Health Center in Queen Creek. Baseline data was collected through a pre-educational survey, which was then compared to the data of the post-educational survey to determine the success of the educational presentation and accompanying handout. This QI project showed a statistically significant increase in parental knowledge of e-cigarettes and their associated health risks, which met the objectives of this DNP project.

Interpretation

Pre- and post-educational survey results showed a statistically significant improvement in parental knowledge of e-cigarettes after reviewing the CATCH My Breath parental toolkit and

participating in the DNP students' educational session. The paired t-test was used to analyze the success of the intervention. With a result of $p<0.001$, the educational intervention successfully increased parental knowledge. Scores increased by an average of 40.63% from pre- to post-educational surveys. Overall, parents reported satisfaction with this QI project and suggested including the adolescent in the educational process in the future. This DNP project identified the CATCH My Breath parental toolkit as an effective evidence-based educational tool for teaching parents of adolescents aged 11-14 years about e-cigarettes and their associated health risks. However, without close follow-up with each participant, it would be challenging to determine if the project had any long-term effects on the parents' desire to talk with their adolescents about vaping or any future reduction of e-cigarette use in their teens.

Implications

Practice

The results from this QI project have shown promising findings associated with using the CATCH My Breath parental toolkit in the pediatric primary care setting at Banner Health Center at Queen Creek. While more data is needed to determine the sustainability of the intervention within this setting, both staff members and parents held positive attitudes towards the increased education targeted at parents of adolescents. Pediatric primary care providers can incorporate the evidence-based CATCH My Breath parental toolkit handout into their adolescent anticipatory guidance during well-child visits. The handout is informational, interactive, and visually appealing to parents. It takes approximately five minutes to go over the handout with the parent and can provide valuable information and helpful resources. Increasing parental knowledge of e-cigarettes and their associated health risks can indirectly benefit the overall health of the

adolescent patient population at Banner Health Center at Queen Creek. The data from the implementation of this project supports the importance of providing parental education on vaping to parents of adolescents at well-child visits.

Education

Parental education on e-cigarettes is essential to implement in pediatric primary care settings. While some pediatric providers already include education about the dangers of vaping and nicotine use, others do not have any discussion of this common and dangerous habit. Provider concerns surrounding vaping prevention education may be eased if proper education is implemented to expand provider awareness of helpful and easy-to-access resources and options for evidence-based education. The AAP and USPSTF emphasize the importance of pediatric primary care providers' role in e-cigarette use prevention (AAP, 2019; USPSTF, 2020). By distributing more education to these providers through annual clinical education sessions, online webinars, or other on-demand educational sessions, they may be more comfortable having these challenging discussions if they are aware of suitable evidence-based educational materials and further resources for parents and adolescents to access if there are questions or concerns; this may include the CATCH My Breath website.

Research

This QI project produced statistically significant results; however, it would be necessary to replicate this intervention with a larger sample size and in other pediatric primary care settings to determine if the same results could be achieved. It is difficult to determine the longevity of knowledge retention based on this QI project implementation. It would be beneficial to conduct further research on the long-term effects of parental knowledge retention at least one month after

the educational session to determine if parents maintained the e-cigarette prevention knowledge. In the future, more research will be needed to determine if an intervention similar to that done in this QI project has any effect on the likelihood of parents having honest discussions about vaping and nicotine use with their adolescents and if that does decrease adolescent rates of e-cigarette use. Additionally, randomized controlled trials that compare different educational interventions may lead to a stronger understanding of the most effective interventions. Given the relative recency of the vaping epidemic, there is also a need for an increased supply of evidence that looks at the long-term health risks of e-cigarette use in adolescents.

Policy

Primary prevention is a crucial pillar of pediatric primary care, focusing on preventing illness and injury before it occurs. A proposed policy change would be for the AAP to include e-cigarettes as a focus topic in the anticipatory guidance section of the Bright Futures Guidelines for Health Supervision of Infants, Children, and Adolescents to ensure it is being addressed at well-child checks with a standardized handout and approach to speaking with the adolescent and parents. Even with AAP recommendations to have providers speak with adolescents privately, many do not get this time to discuss topics like nicotine use (AAP, 2019). By standardizing the approach to speaking about topics like e-cigarette use through AAP handouts and helpful, easy-to-access provider resources, pediatric primary care providers may be more likely to incorporate primary vaping prevention into their daily practice. The CATCH My Breath parental toolkit proved successful in this QI project, indicating that a similar educational intervention and handout could be successful on a larger scale.

Strengths

This project contained a thorough review of the current literature to support the intervention of educating parents of adolescents on e-cigarettes and their associated health risks with the use of the CATCH My Breath parental toolkit handout. This QI project affirmed the existing literature findings, bringing about new questions and considerations for future research. The Health Belief Model (HBM) was used as a theoretical framework, which provided an overarching guide to developing the educational intervention for this QI project. The PDSA model was used to support this project's implementation and guide any modifications needed for future implementations based on the results of the initial cycle.

Limitations

There were several limitations to this DNP project. The project sample was recruited via convenience and only from a single site, which means it does not reflect the generalized population and creates potentially biased results. Another limitation to the recruitment of participants was an unexpected change in MAs part way through the implementation period. The replacement MA was a float pool staff member who appeared less engaged with the project than the prior core staff MA who had a strong rapport with the patients and parents. It is possible that fewer parents were willing to participate in the project when being recruited by the float pool MA since they did not have an established relationship with her.

While the CATCH My Breath parental toolkit handout was very informative, it was not created for use within the healthcare setting, which could affect the reliability and validity of the results. The content questions of the pre- and post-educational surveys were created by Dr. Melyssa Carlson and were associated with a different educational handout. Although all the

questions were answered within this DNP student's educational session, this may compromise the validity of the survey results. However, a content expert did review the intervention materials and surveys before implementing this DNP project, which contributes to the validity of the project data.

Another limitation of this project was the small sample size (n=8). The goal was to have at least 10 participants, but unfortunately, only eight could be recruited within the implementation time frame. Factors involved in this included that the clinic is located within Queen Creek, where their public school district follows a year-round school schedule, so students were back to school starting in mid-July after summer vacation. More students completed well-child visits over the summer, and by the time the project was implemented in September, most 11–14-year-old students had already completed their well-child exams for that year.

The time available for implementing the project and educational session posed an additional limitation. The project was implemented over a few weeks, so no long-term outcomes or effectiveness could be measured. Also, this QI project added five or more minutes to the time that families were in patient rooms; the student had to ensure that parents were given adequate time to review the handout and fill out both the pre- and post-educational surveys while simultaneously working to not occupy patient rooms for too long, as this could put the provider behind and increase the waiting time for other patients. Future studies are needed to determine if education on e-cigarettes and their health risks aimed at parents of adolescents improves parental intent and action in having discussions with their teens and if parent-focused educational

sessions affect adolescent vaping rates. These studies need to be conducted with larger sample sizes and in multiple settings to make the results more generalizable to the public.

DNP Essentials Addressed

The American Academy of Colleges of Nursing (AACN) created eight foundational competencies that are core to advanced nursing practice roles called Doctor of Nursing Practice (DNP) Essentials (AACN, 2006). There are eight DNP Essentials, and three were used to help guide this project: DNP Essentials I, II, and III.

DNP Essential I: Scientific Underpinnings for Practice

DNP Essential I emphasizes the need for using evidence-based practice to turn research into practice. It can be done by integrating nursing science with knowledge, using guiding theories, and creating and evaluating new practice approaches based on nursing theories (AACN, 2006). A thorough literature review was done for this DNP project. It meets DNP Essential I by determining a need for parental education on e-cigarettes and their health risks and supporting an evidence-based educational handout. It was then put into practice by implementing an educational session using an evidence-based educational handout for parents of adolescents at their annual well-child visits.

DNP Essential II: Organizational and Systems Leadership for Quality Improvement and Systems Thinking

DNP Essential II focuses on developing and evaluating care that may meet the current and future needs of patient populations. It also requires a strong understanding of how to implement QI projects, with the need for backing from key stakeholders (AACN, 2006). This DNP student utilized advanced professional communication to organize and implement this QI

project with the support of Banner Health and the on-site leadership at the Banner Health Center at Queen Creek. The need for e-cigarette education at well-child visits was determined for this population, and a new, low-cost, but high-reward intervention was developed to address this practice problem and meet the needs of the patients and their parents.

DNP Essentials III: Clinical Scholarship and Analytical Methods for Evidence-Based Practice

The third DNP Essential looks to the graduate-prepared nurse to use analytic methods to appraise literature critically, translate evidence into practice, and evaluate the effects of the QI project (AACN, 2006). The DNP student identified a problem, completed a thorough literature search, synthesized and critically appraised the literature, and created an evidence-based educational intervention using the CATCH My Breath parental toolkit to initiate a change in practice to promote improved anticipatory guidance, support of parents, and ultimately higher quality patient-centered care. The student then completed an in-depth data analysis through pre- and post-educational surveys to evaluate the effectiveness of the intervention.

Integration of Theoretical Framework

Primary care pediatric providers should focus on educating patients and families through evidence-based anticipatory guidance. It can be done to improve patient health, safety, and overall quality of life. The Health Belief Model was used as the theoretical framework to guide the development and implementation of the educational intervention for this DNP project. This guiding model has six components: perceived susceptibility, severity, benefits of taking action, barriers to action, cues to action, and self-efficacy; these different features balance one’s willingness to change and a desire to maintain current practices (Rosenstock et al., 1988). All six

features were considered for this QI project to create a balance between parental willingness to modify their behaviors and interactions with their adolescents and their desire to maintain a more hands-off approach in speaking with and educating their teens. The HBM guided this QI project to a successful implementation, as evidenced by statistically significant increases in post-educational survey scores and parental reports of satisfaction with the educational session and handout.

Conclusions

This DNP project evaluated the implementation of an evidence-based educational intervention to increase parental knowledge of e-cigarettes and their associated health risks. An educational session using the CATCH My Breath parental toolkit was implemented at the Banner Health Center at Queen Creek. Eight parents participated in the educational session on e-cigarettes. Pre- and post-educational surveys were analyzed and showed a statistically significant increase in parental knowledge of e-cigarettes and their associated health risks. The findings of this project are consistent with prior research, supporting the idea that parental education and educational handouts can improve their knowledge of e-cigarettes and their health risks. Future research should focus on developing a standardized educational handout and resources for providers performing the education, the long-term effectiveness of parental education on rates of parents having discussions with their teens, and the impact of these educational sessions on adolescent vaping rates.

Plan for Sustainability

Clinic physicians and administrators should review the data from this initial PDSA cycle to determine if any future changes need to be made to promote sustainability at this clinical site.

To increase the use of the CATCH My Breath parental toolkit during well-child visits, the handout was delivered to the senior manager of physician practice at Banner Health Center at Queen Creek and the Banner Medical Group Physician Executive who sponsored this QI project. The continued use of this evidence-based handout was encouraged, and recommendations were made on incorporating it into well-child exams.

Plan for Dissemination

The results of the QI project were shared with the involved providers and the leadership at the Banner Health Center at Queen Creek via email. The involved providers were invited to attend the final defense presentation. Contact information for the student was provided to clinic leadership if any further questions or inquiries on the intervention emerge in the future. Contact information was also provided to project participants during the educational sessions, and they were encouraged to reach out if any further questions were related to the project or educational information discussed. This project could potentially be disseminated through a conference poster presentation or publication in the future. Ultimately, the knowledge gained from this DNP project will be applied to the DNP student's future practice as a pediatric nurse practitioner to contribute to healthy decisions and improved outcomes for the adolescent population. Should the situation allow the CATCH My Breath parental toolkit will be introduced into the student's future practice as a primary care provider to prevent adolescent vaping in the selected patient population.

APPENDIX A

BANNER HEALTH LETTERS OF SUPPORT FROM MENTOR AND SPONSOR AND BANNER HEALTH RESEARCH DETERMINATION COMMITTEE APPROVAL LETTER

Banner Health Center of Queen Creek
21772 S. Ellsworth Loop Road
Queen Creek, AZ 85142

Date: June 28, 2023

Please note that Ms. Hayley Comrie, University of Arizona Doctor of Nursing Practice student, has my support to conduct a quality improvement project at our facility for her project, "Utilizing Evidence-Based Education to Increase Parental Knowledge of Adolescent Vaping."

Ms. Hayley Comrie will educate parents of adolescents aged 11-14 years at well child visits on the health risks associated with electronic cigarette use in adolescents. She will recruit parents through a flyer which describes the educational session, when the session takes place, and the amount of time involved. Ms. Comrie's activities will be completed by December 14th, 2023.

Ms. Comrie has agreed to provide office leadership with a copy of the Banner Health Research Determination Committee approval letter before she recruits participants. She will also present aggregate results to the leadership of this clinic after completion of the project.

If there are any questions, please contact my office.

Signed,

Joshua Eberhard, D.O.
Banner Health Center
21772 S Ellsworth Loop Rd
Queen Creek, AZ 85142
Phone (480) 512-3700, Fax (480) 512-3715
NPI 1073923793

Banner Health Center of Queen Creek
21772 S. Ellsworth Loop Road
Queen Creek, AZ 85142

Date: June 28, 2023

Please note that Ms. Hayley Comrie, University of Arizona Doctor of Nursing Practice student, has my support to conduct a quality improvement project at our facility for her project, "Utilizing Evidence-Based Education to Increase Parental Knowledge of Adolescent Vaping."

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If there are any questions, please contact my office.

Signed,

DAVID M VALENZUELA MD
BMG PHYSICIAN EXECUTIVE
AZ PRIMARY CARE

Banner Health
FWA #00002630
IORG #0004299

August 08, 2023

Hayley Comrie, BSN
Banner Health Center Queen Creek
21772 S Ellsworth Lp Rd
Queen Creek, AZ 85142

RE: RDC Project # -23-0051: Utilizing Evidence-Based Education to Increase Parental Knowledge of Adolescent Vaping
iRIS Reference # 022548
RDC Review and Approval: Project Review Application (Version 2.0 dated 7/28/2023), CATCH My Breath Parental Toolkit Handout (Version 1.0 dated 7/28/2023), Script for Educational Session with CATCH My Breath Parental Toolkit Handout (V2.0 dated 7/28/2023), Disclosure -Consent (V2.0 dated 7/28/2023), Recruitment Flyer (V1.0 dated 7/24/2023), Pre-Education Survey (V1.0 dated 7/24/2023), Post-Education Survey (V1.0 dated 7/24/2023), Data Collection Form (V1.0 dated 7/24/2023)
Research Determination Committee Evaluation: Not Research, No IRB Review and Approval Required

Dear Hayley Comrie,

Thank you for submitting your project. The project information you provided was reviewed and approved on August 8, 2023 by the Research Determination Committee (RDC) on behalf of the Banner Health Institutional Review Board (IRB). The project is approved.

The RDC determined this project is not research per 45 CFR 46.102(l). The projects objective is to standardize vaping education given to parents of adolescents. Whlie there is a systematic aspect to the study, a pre/post survey to be used to test parental knowledge and an educational session, the project will not contribute to generalizable knowledge, it will not develop new understanding or fill a gap in the scientific knowledge on this topic. The project will use a validated education toolkit, Catch My Breath, that is publicly available, and if effective may be used to standardize education on this topic at Banner Health Queen Creek. As such, this project does not require IRB review and approval.

However, since both the parent and child will be present for the education session and it is not being presented by a counselor nor will a counselor or therapist be present, the Committee has recommended you and your advisors create a Risk Mitigation Plan for this project to address the risk of parent/adolescent conflict or potential contentious discussion resulting from the educational presentation.

PLEASE NOTE

The RDC determination is based on the information you provided to the committee on your application version 2.0 and supporting documents. In the event the project is misrepresented in the above statement, or if the project is modified in any way, such as, but not limited to, re-analysis of data, adding/revising data sheets, changing team members or the addition of new information, the determination is no longer valid. If any changes are required, please reach out to the IRB Manager for further direction as to how to submit the revisions. IRB Manager contact information can be located on the HRPP employee website at https://bannerhealth.sharepoint.com/sites/Connect/Banner-Research/Human-Research-Protection-Program, under the Our Leaders tab.

Please note: As part of continuing process improvement, random audits are conducted to assess compliance and adherence with submitted/approved applications.

A copy of this letter will be retained electronically.

Sincerely,

Kathryn Reitz, BS, CIP
Director, Human Research Protection Program (HRPP)
Banner Health

KR/jh
Cc: Joshua Eberhard, DO
David Valenzuela, MD

APPENDIX B

CONSENT DOCUMENT (DISCLOSURE AND CONSENT FORM)

Electronic Cigarette Education for Parents of Adolescents Aged 11-14 Years

Hayley Comrie

You are being asked to participate in a quality improvement project being conducted by Hayley Comrie. This is part of her doctoral of nursing practice education. The purpose of this project is to provide evidence-based education to parents or guardians of adolescents on electronic cigarettes and their associated health risks.

If you choose to take part in this project, you will be asked to participate in an education session during your child's well child visit that will last 5-10 minutes. The education session will be conducted face-to-face using an evidence-based educational handout. Your participation will include completing an 11-item pre-educational survey, participating in the brief educational session, and completing the 10-item post-educational survey. There are no foreseeable risks associated with participating in this project, other than the time associated with your participation. You will receive no immediate benefit from your participation. There is no financial compensation for your participation. Your responses are anonymous. Your name will not be collected or be linked with your answers.

If you choose to participate in this project, participation is strictly voluntary. Refusal to participate will involve no penalty, loss of benefits, or change in health care provided. You may withdraw at any time.

If you participate, you agree to have your responses used for data analysis in this project. You may skip any questions on the pre- and post-educational surveys that you choose not to answer. By participating you do not give up any personal legal rights you may have as a participant in this project.

For questions, concerns, or complaints about the project, you may call Hayley Comrie, BSN, RN, DNP-PNP Student, The University of Arizona, at 520-303-8554 or email hcomrie@arizona.edu

APPENDIX C

RECRUITMENT MATERIAL (RECRUITMENT FLYER)

Are you a parent/guardian of an adolescent aged 11-14 years? Do you want to increase your knowledge on electronic cigarettes and vaping?

E-cigarette use and vaping are common among adolescents, and they can cause serious health risks. Do you know the health risks of vaping or how to talk to your adolescent about these risks?

A 5–10-minute educational session can increase your knowledge of e-cigarettes and their health risks in adolescents. Attendance is during your adolescent's annual well child visit.

Do you want to participate?

If so, please let the front desk or medical assistant know you wish to participate.

For questions please contact:
Hayley Comrie
hcomrie@arizona.edu
520-303-8554

APPENDIX D

EVALUATION INSTRUMENTS (PRE- AND POST-EDUCATIONAL SURVEYS)

Pre-Education Survey

Please type in your mother's initials and the number of the month she was born. Example "LC04". This code is only being used to align your pre-education and post-education survey answers. All answers will remain anonymous. You will need to remember this code for your post-education survey.

Baseline questions, please circle either yes or no:

1) Have you ever received education about e-cigarettes or vaping in the past?
   Yes No

2) Have you ever had conversations with your adolescent about e-cigarette use and their risks?
   Yes No

3) Does anyone in the household smoke or vape?
   Yes No

Answer the following questions based on your knowledge of electronic cigarettes or vaping and health risks.

1) Which of these ingredients is not found in electronic cigarettes?
   a) Nicotine
   b) Tobacco
   c) Heavy metals
   d) Propylene glycol

2) Electronic cigarettes can be shaped like which of the following?
   a) Watch
   b) Keys
   c) Book
   d) Gum package

3) This many high schoolers report current use of electronic cigarettes:
   a) 1 in 20
   b) 1 in 10
   c) 1 in 4
   d) 1 in 5

4) Electronic cigarettes contain this cancer-causing ingredient:
   a) Ethylene oxide
   b) Formaldehyde
   c) Acetone

d) Alcohol

5) Health risks associated with vaping include:
   a) Joint pain
   b) Pink eye
   c) Asthma
   d) Obesity

6) One sign of electronic cigarette addiction is:
   a) Eating more food than normal
   b) Feeling anxious or irritable
   c) Spending more time with family
   d) Waking up early in the morning

7) Ways to teach your adolescent to say no to electronic cigarettes include:
   a) Tell them to try cigarettes instead
   b) Tell them to find a different friend group
   c) Tell them to try the electronic cigarette one time only
   d) Tell them to change the topic

8) Ways to promote a healthy, smoke free home include:
   a) Set family health goals each week, such as walking together
   b) Have adult smokers go outside to smoke
   c) Do not talk about electronic cigarettes with your adolescent as it may give them ideas
   d) Provide junk food

Post-Education Survey

Please type in your mother's initials and the number of the month she was born. Example "LC04". This is only being used to align your pre-education and post-education survey answers. All answers will remain anonymous. This code should be the same as what you entered on the pre-test.

Answer the following questions based on your knowledge of electronic cigarettes or vaping and health risks.

1) Which of these ingredients is not found in electronic cigarettes?
   a) Nicotine
   b) Tobacco
   c) Heavy metals
   d) Propylene glycol

2) Electronic cigarettes can be shaped like which of the following?
   a) Watch
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   c) Book
   d) Gum package

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   b) 1 in 10
   c) 1 in 4
   d) 1 in 5

4) Electronic cigarettes contain this cancer-causing ingredient:
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   b) Formaldehyde
   c) Acetone
   d) Alcohol

5) Health risks associated with vaping include:
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   c) Asthma
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   d) Tell them to change the topic

8) Ways to promote a healthy, smoke free home include:
   a) Set family health goals each week, such as walking together
   b) Have adult smokers go outside to smoke
   c) Do not talk about electronic cigarettes with your adolescent as it may give them ideas
   d) Provide junk food

9) Please explain how satisfied/unsatisfied you were with this educational session.
   _____
   _____
   _____

10) Please offer any suggestions you have for improvement.
   _____
   _____
   _____

APPENDIX E

PARTICIPANT MATERIAL (INSTRUCTIONAL EDUCATIONAL HANDOUT)

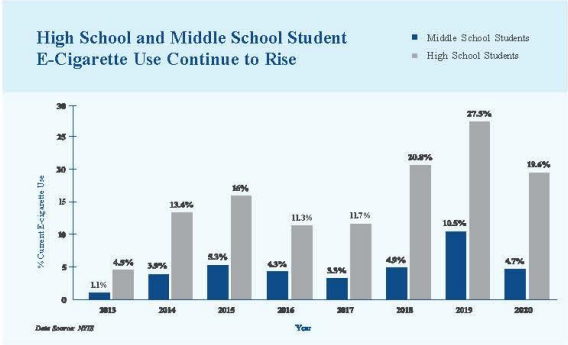
CATCH MY BREATH

4 Fast Facts on the Vaping Epidemic

Electronic nicotine delivery systems (ENDS) are also known as "e-cigarettes," "e-cigs," "vapes," or "vape pens." They use a nicotine liquid, also called e-liquid or e-juice, or fluid-filled pods. Many are fruit or candy flavored.

E-cigarettes were developed as a safer alternative to combustible cigarettes, but they have quickly become an on-ramp for nicotine addiction for young people. The CDC has warned that e-cigarettes are not safe for youth, young adults, pregnant women, or non-smoking adults.

Fact 1: In today's world, every child is at risk of trying e-cigarettes: even yours!



- As a parent, you can do everything right and vaping could still happen **to your child**.
- E-cigarette use happens in **all social groups,** even students in sports and on the honor roll.
- Between 2013 and 2020, high school e-cigarette use has **increased 335%,** and middle school use has **increased 327%.** Although we have recently seen a decline in use for both age groups, the current rates still indicate that 3.6 million youth are still vaping.
- Vape shops have been found to sell to minors and claim e-cigarettes are harmless.

Fact 2: Most e-cigarettes have nicotine, which harms brain health.

- Experts (and vaping companies) all agree: **no level** of nicotine is safe for young people.
- Nicotine in e-cigarettes can rewire the adolescent brain for **other addictions** like drugs and alcohol.
- Nicotine can harm your child's mood, behavior, and judgement which can cause **issues in school**. It often makes them more anxious or irritable.
- JUUL and some disposables, two popular brands, have extremely high levels of nicotine. One JUUL pod has **one pack (20 cigarettes) worth of nicotine**.
- The nicotine in e-cigarettes is the same addictive chemical in regular cigarettes or other tobacco products.
- E-cigarettes not only contain nicotine, but the vaping liquid is often made from propylene glycol and contains heavy metals.

Fact 3: Lots of young people think it's safe… but it's not.

- Many children don't know the harms of e-cigarettes. They try it because they are curious about the flavors.
- Children who use e-cigarettes are more than **6.8 times** likely to start smoking cigarettes.
- The tiny particles in e-cigarettes can **harm the users' lungs**, making it harder to breathe. Asthma is a significant associated health risk.
- Some unregulated 'street' products have caused **permanent lung injuries** and even **death**.
- Scientists are still discovering all the long-term effects of e-cigarettes. Is your child part of the **experiment**?

Fact 4: Vaping can be hard to spot.

- Lots of teens and tweens have secretly vaped in **classrooms, school bathrooms, and even at home**.
- E-cigarettes look like everyday objects, are easy to hide and don't smell like cigarettes. They can look like USB sticks, pens, or even watches.
- There are accessories—like **clothing, backpacks, and cases**—that are designed to hide e-cigarettes.
- Because vaping is so new, **parents may not know** the signs or symptoms of use to look for.

The Surgeon General: e-cigarettes.surgeongeneral.gov | The CDC: cdc.gov/tobacco/basic_information/e-cigarettes/index.htm

Is your child at risk of trying e-cigarettes?

The short answer is: **Yes.** In 2020, over 3 million high school and 550,000 middle school students reported using e-cigarettes. By high school, 1 in 5 students reported regularly using e-cigarettes.

The topic of vaping is tough for anyone, but especially for young people. E-cigarettes can be a major problem at school, and targeted advertising make it difficult to ignore or refuse. Your child will someday be asked to take a puff.

Luckily, parenting research tells us a handful of parent actions that will make a difference in your child's decisions about e-cigarettes and tobacco products. Check below to see how you're already supporting your family.

Circle the answer that most describes your family	A	B	C
1. I've told my child about the harms of tobacco products, including e-cigarettes.	Yes	I will	No
2. I've told my child that tobacco and e-cigarette companies pay celebrities and social media 'influencers' to post positive messages about their products.	Yes	I will	No
3. In our home, we have non-smoking rules for children under 21 years old that include e-cigarettes.	Yes	I will	No
4. I always know where my child is during their free time - before and after school, and on weekends.	All the time	Sometimes	No
5. When setting and enforcing home rules, my child would describe me as "tough but fair."	All the time	Sometimes	No
6. My child is involved in frequent extracurricular activities (e.g., art, sports, school clubs, band, etc.).	Yes	Sometimes	No
7. I generally praise my child for good behaviors like not using e-cigarettes.	All the time	Sometimes	No
8. My child cannot attend events or activities without adult supervision.	All the time	Sometimes	No
9. I know the names and phone numbers of my child's friends.	All of them	Some of them	None of them
10. I know the names and phone numbers of the parents of my child's friends.	All of them	Some of them	None of them
11. No adults in our home use tobacco products regularly, including e-cigarettes.	No one smokes	Some smoke	All smoke
12. I would definitely know if my child were using tobacco products, including e-cigarettes.	I would know	Maybe	Probably Not
Add up the number you circled in each column.	_____	_____	_____

A parent can do everything right, and your child may still choose to experiment with e-cigarettes. However, we can lower their risk by applying a few 'tried and true' parenting strategies. Your goal is to score more A's than B's and C's.

CATCH MY BREATH

Checking-In: An Effective Way to Support your Child

Checking-in with your child helps you keep track of their social activity, set rules about their free time, and tune in to when something might be wrong.

These simple questions and actions can have a BIG effect on their decisions including whether or not to try e-cigarettes. A few rules about their free time can prevent opportunities for risky behavior. Use the list below to identify easy ways for you to check-in with your child.

Where, Who, When?

Ask where your child is going, who they're going with, and when they will be back.

Make Connections

Know the names and contact information for their friends and parents of friends. Work to be more involved in their social lives.

Keep Them Busy

Encourage and help your children enroll in after school activities they enjoy. Set family health goals each week, like going for walks together.

Attend School Events

Be sure to keep in touch with teachers, coaches, and staff.

Set Rules

Require adult supervision and curfews. Be consistent in enforcing fair consequences.

Checking-in with your child decreases opportunities to make risky choices about tobacco products and alerts you to possible problems. It's also helpful to know what you're up against. Check out the resources below to learn more about the e-cigarette epidemic and parent tips to support your child.

CATCH My Breath: Catch.org/pages/CMB-Parent-Resources

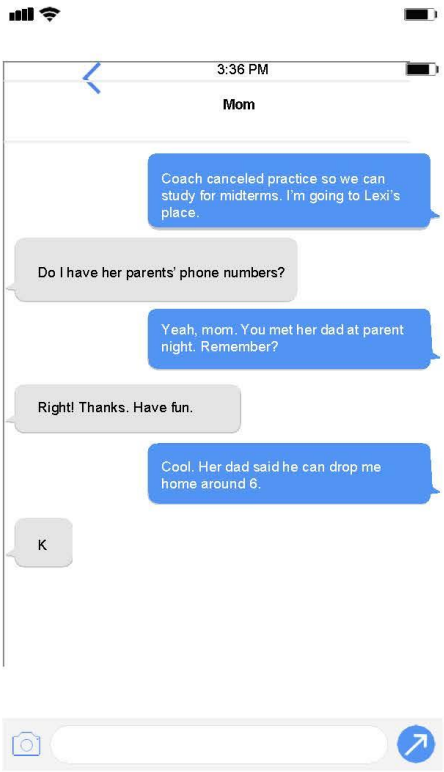
Nemours Children's Health Care and Parenting Tips: KidsHealth.org

The Surgeon General: e-cigarettes.SurgeonGeneral.gov

The Centers for Disease Control and Prevention: CDC.gov/tobacco/basic_information/e-cigarettes/index.html

1/2

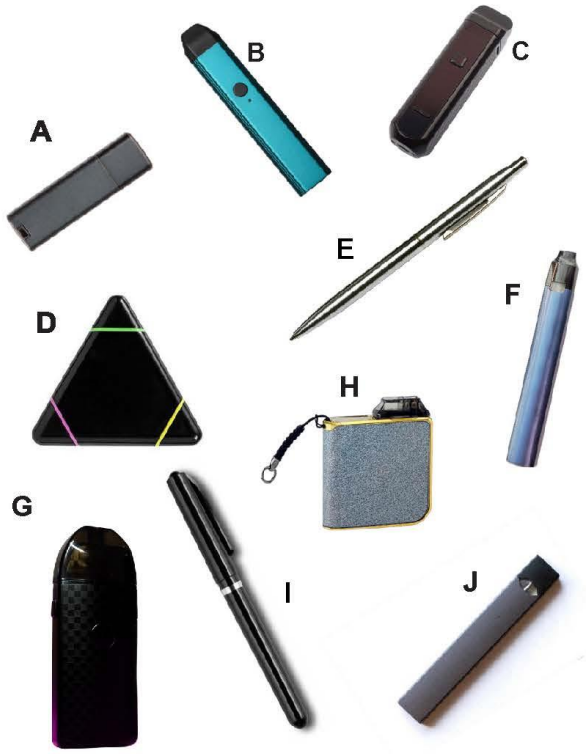
Children who needed to check-in with their parents about their free time were half as likely to try tobacco products.



Spot the Vapes

You see the following school supplies laying out on your child's desk. What you may not realize is that some of these "supplies" are actually e-cigarettes.

Circle the ones that you think are e-cigarettes and check your answers in the box below. **Hint**: There are 6 vaping devices.



Spot the Vaper

Below are 6 signs that they might be vaping.

- A sweet, fruity, or minty smell in their room or on their clothes
- Always thirsty or have dry mouth
- Often make excuses to go to the bathroom or outside during family time
- Frequent cough and/or nose bleeds
- Change in mood like being more irritable or anxious
- Change in eating habits

If you think your child could be vaping, talk to your child's physician and/or go to teen.smokefree.gov.

Answers: B, C, F, G, I and J are vaping devices. Didn't do so well? Don't worry. A lot of adults struggle with spotting e-cigarettes, especially because there are continually new devices and designs.

Find more information at:

CatchMyBreath.org | TobaccoFreeKids.org | ParentsAgainstVaping.org | E-Cigarette, or Vaping, Products Visual Dictionary

Common Roadblocks to Having the Talk about Tobacco & Vaping

"I feel like a hypocrite."	"They already know not to smoke or vape."
• Be clear that, even though you use tobacco, it's not ok for someone their age and why. • It's never too late to quit. It usually takes many attempts to quit for good. Call 1-800-QUIT-NOW (1-800-784-8669) to make an attempt. • If you don't intend to quit, it's even more important to have that conversation.	• That's great! Your child probably knows that smoking and vaping are dangerous, but research shows they need to hear clear expectations from you. • New information is coming out every single day. You can keep looking for new facts to share with your child by searching, "CDC: Know the Facts" on the internet.
"I don't know how to start the conversation."	**"My kids won't listen to me."**
• Before talking with your child, you want to learn all you can. Check out links on the bottom of these pages to get more information. • Practice what you might say and how you would respond to questions. • Use a natural opportunity to bring up tobacco and vaping like seeing an e-cigarette advertisement or someone smoking.	• Not true! While they may be hearing new opinions from peers and social media, what you say will always matter. • Despite how it feels, research shows us that parents actually have the biggest influence when it comes to tobacco and e-cigarette use.
"My child is too young to be talking about tobacco or vaping."	**"It'll be uncomfortable."**
• Vaping and smoking are everywhere—on social media, TV, movies, and at school— even elementary school! • Children of any age need to know the truth about tobacco products and vaping. • Younger children don't need all the details, but they do need to know that tobacco products are dangerous, and you disapprove of children using them. Keep the conversation short and direct.	• You're not alone! Most parents feel uncomfortable talking about substance abuse and addiction with their children. • It's true that some children resist 'serious' talks but they're still listening despite the eye-rolling. • If a few minutes could save your child from forming an addiction or getting in trouble at school, isn't it worth it?

For adults: If you are ready to quit tobacco, call the Quitline at 1-800-QUIT-NOW (1-800-784-8669) for help.
For children: To help your child quit vaping, have them text DITCHJUUL to 88709.
The Surgeon General: e-cigarettes.surgeongeneral.gov
The Centers for Disease Control and Prevention: cdc.gov/tobacco/basic_information/e-cigarettes/index.htm

CATCH MY BREATH

How to Talk to your Child about Smoking & Vaping

If you feel overwhelmed about what exactly to say to your child about tobacco products, you're not alone. To make it easier, we've provided suggestions below using what has worked for other parents.

What you expect	Be clear about what you expect. While it's helpful to start the conversation with questions and hear your child's thoughts and experiences, be direct with them. Here are some example statements. Pick what suits your family best: • "We don't want you to use tobacco or e-cigarettes." • "We disapprove of teens vaping." • "I'm proud of you for not using e-cigarettes." • "In our family, nobody under age 21 can smoke or vape."
Why it's important	It's easy to say, "Don't do it because it's bad for you," but that's not as effective as explaining the reasons why it's bad for them. Also, remember young people don't think much about long- term health consequences, like cancer or heart attacks. Instead, focus on the immediate social consequences, such as getting in trouble or losing control due to nicotine addiction. • "The nicotine in tobacco and e-cigarettes is addictive. Once you start it's very hard to stop." • "What do you think would happen if you got caught vaping at school? You can get in big trouble like getting kicked off the team/out of the club." • "Nicotine is bad for your brain. It makes it hard to think clearly around friends and in school."
How to respond	Your child may have been invited to smoke or vape and didn't know what to do. Ask open-ended questions and make it clear that you are listening to them. Teach them how to respond with some refusal skills and exit strategies. • "If anyone is pushing you to do anything you don't want to, just call. I'll pick you up, no questions asked. Better safe than sorry." • "If someone offers you an e-cigarette, say something like this: o 'No way! Coach/my mom would be really mad if I got caught vaping.' o 'I'm not getting in trouble just for that.' o 'I can't afford to get addicted to that junk.' o Change the topic. 'Hey, are you going to soccer practice today?'
If they do it	It's natural to feel upset if you find out that your child has experimented with tobacco. You may need to take a few minutes to yourself before talking with your child. Remember to convey that you love them but disapprove of the behavior. Remind them about the family rules about smoking and be clear about the consequences. A small consequence will get the message across whereas severe consequences may have the opposite effect. Here are some consequences that parents have used: • Loss of phone privileges for 1 week • Loss of 1 month of allowance • Limitations on social activities for 2 weeks • Writing a report to the parent about the dangers of e-cigarettes If your child is caught vaping multiple times, it may be time to treat the addiction. To help your child quit vaping, have them go to truthinitiative.org/thisisquitting or text DITCHJUUL to 88709.

CatchMyBreath.org | TobaccoFreeKids.org | ParentsAgainstVaping.org

Be Ready for Tough Questions about Vaping

While most parents expect their child not to smoke or vape, studies show that you need to make that expectation clear. Despite what your child says or does, you still have a lot of influence on their decisions. Lots of parents have found it helpful to practice their responses to tough questions. We've put together a worksheet to help you answer some possible tough questions your child might ask you.

Why don't you want me to use e-cigarettes (or tobacco)?

Here are some suggestions on how to respond:

- Science shows that there are addictive and dangerous chemicals in e-cigarettes and tobacco products.
- Because you are still growing, nicotine is especially addictive and can harm your brain permanently.
- The tiny particles that are inhaled when someone uses e-cigarettes can harm their lungs making it harder for them to breathe, make asthma worse, give them a bad cough, nose bleeds, and more.

Make it your own:

_____

_____

_____

_____

E-cigarettes just have nicotine and none of the "bad stuff" like cigarettes. Who cares?

- Nicotine is still a problem. It makes it hard to think clearly around friends and in school.
- Since your brain is still growing, nicotine is especially harmful for you.
- Using e-cigarettes makes it 6.8 times more likely you'll get addicted to regular cigarettes later. It can even change your brain, so you are more likely you'll get addicted to other substances like alcohol or drugs.
- We don't know the all the long-term effects for all the chemicals inside e-cigarettes.

  Formaldehyde is known to cause cancer and is often found in e-cigarettes.

Make it your own:

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At least I wouldn't be smoking cigarettes or doing something worse. It's just a vape.

- I'm proud that you're making good decisions. E-cigarettes can still harm your body and brain even if they don't have the same toxins.
- Whether you get nicotine from an e-cigarette or other tobacco products, it is still risky for your brain.
- E-cigarettes haven't been around long enough for us to know all the possible harms they cause.
- Just because e-cigarettes are advertised to be safer, that doesn't mean they're healthy or even safe.

Make it your own:

_____

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Everybody is doing it. It's not a big deal.

- Thank you for being honest with me. Science shows that there are a lot of bad things that come from using e-cigarettes like lung injury, addiction, brain changes, and more. That's a big deal.
- Every time a young person vapes, they risk short and long term health consequences.

Make it your own:

_____

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_____

You smoke cigarettes/use e-cigarettes. Why shouldn't I?

- Just because I smoke/vape, doesn't mean you should. Once you are addicted, it's really hard to quit.
- It's legal for me to smoke/vape but not for you. There are laws to protect you because nicotine permanently damages growing brains.
- If I had a chance to go back and change time, I would not have started smoking or using e-cigarettes. Nicotine is very addictive, making it really hard to stop.
- I plan to try to quit again sometime. It takes most people many tries to quit for good. I don't want you to have to go through what I have gone through. If you don't start, you'll never have to stop.

Make it your own:

_____

_____

_____

Find more information at:
CATCH My Breath: Catch.org/pages/CMB-Parent-Resources The Surgeon General: e-cigarettes.SurgeonGeneral.gov
The Centers for Disease Control and Prevention: CDC.gov/tobacco/basic_information/e-cigarettes/index.htm
Campaign for Tobacco Free Kids: TobaccoFreeKids.org
Parents Against Vaping e-cigarettes: ParentsAgainstVaping.org
Nemours Children's Health Care and Parenting Tips: KidsHealth.org

APPENDIX F

SCRIPT FOR PARENTAL EDUCATIONAL SESSION

Hello, my name is Hayley and I am a pediatric nurse practitioner student with Dr. Eberhard today. You indicated at check-in that your child is 11-14 years old and that you were interested in participating in a voluntary educational session to learn about e-cigarettes and their associated health risks. Thank you for filling out the pre-educational questionnaire, you will receive another one at the end of the session and that is where you can leave any feedback you may have. This packet is the handout from the parental toolkit that is a part of the educational campaign CATCH My Breath. You can take this handout home at the end of today's session to fill out some of the short answer questions and reference later on. This is also found online with helpful step-by-step videos if you are interested. At the bottom of each page in this handout are added online resources that you can access for more information on the specific topic. So, let's begin.

1st page: E-cigarettes or vape pens use a liquid that is kept in a disposable or refillable container that contains nicotine, which is why e-cigarettes are addictive. These liquids are often flavored like fruit, cotton candy, or mint to be more appealing, especially to younger people. E-cigarettes were initially developed to help people quit traditional cigarettes, but they have now become very popular, particularly in the adolescent population. The CDC, as well as many other national healthcare organizations, have warned that e-cigarettes are not safe for adolescents, and they come with significant health risks. Every child is at risk of trying e-cigarettes, even if they are in honors classes or do not have 'questionable' friend groups. Rates of adolescent use have skyrocketed in the last decade leading to the Surgeon General declaring an epidemic. E-cigarettes do not contain tobacco itself, but they do contain nicotine, which is the addictive component derived from tobacco. Nicotine is not safe for children in any amount. An adolescent brain is not fully developed, and nicotine is not only dependence-forming, but it can also affect their behavior, increase anxiety, and increase the likelihood of future traditional cigarette and drug use. The e-liquid also contains dangerous chemicals including formaldehyde and heavy metals which can cause significant health effects like an elevated cancer risk. Many people, adults and children, think e-cigarettes are safe, but they are not. Children who have asthma are specifically advised to avoid e-cigarettes, or any form of smoking, due to risks of airway irritation, difficulty breathing, and potentially life-threatening symptoms. Vaping can be challenging to see in teens because the devices are so small and easily concealable. Do you know what e-cigarettes can look like? They can be shaped like USB sticks, pens, or even a watch.

2nd page: Is your child at risk of trying e-cigarettes? The short answer is yes, everyone is at risk. 1 in 5 highschoolers reported regularly using e-cigarettes in 2020—that could include your child. You can take this short questionnaire at home to determine your child's risk of trying e-cigarettes.

3rd page: One of the easiest ways to support your child is to check-in with them often and know what they are doing, with who, and when. Children who were required to check-in with their parents about their free time were half as likely to try tobacco products. Get the contact information of their friends and their parents and try to be involved in their social lives. Another important aspect is to keep them busy with productive and interactive activities, exercise is always a good idea to encourage. One helpful tip is setting weekly family health goals, like going for walks together. Make sure to set reasonable goals and expectations and be consistent with their enforcement and the resultant consequences.

4th page: Do you know which of these pictures are vapes? Hint there are 6 of them. The correct answers are B, C, F, G, I, J. One of the challenges is that the appearance of e-cigarettes or vapes is constantly changing; use the links at the bottom of the page to get updated information over time. On the right hand side of the page there are some helpful tips that might indicate your child is vaping: they may smell fruity, minty, or sweet and frequently have a dry mouth; they often will make excuses to be by themselves like going to the bathroom or going outside; they may be coughing more, have changes in their mood to be more anxious or irritable.

5th page: This page goes through some of the most common roadblocks in having "the talk" with your child. If you smoke or vape yourself, this first block that discusses feeling like a hypocrite may be helpful. Remember that the earlier you have this conversation with them, the higher the likelihood you are catching them before their first experience.

6th page: One of the hardest parts of this is figuring out how to talk to your child about smoking and vaping. Here are some helpful talking points that have worked well for other parents. First, be clear about what you expect from them. Be direct, while still listening to their thoughts and questions. Next, explain why it is important. It is easy to just say "don't do it because it's bad for you," but this will not help as they often are not concerned with long-term health consequences. Instead, most teens are more focused on the immediate consequences, like getting in trouble, getting kicked off of a sports team or club, or becoming addicted to something. The next step is knowing how to respond. Ask open-ended questions and listen attentively. Teach them some good refusal and exit strategies. This can include saying "no way! My coach or mom would be really mad" or change the topic and start a new conversation. Remember that your teen may tell you at this point that they have tried vaping before or were offered an e-cigarette in the past. The key is to stay calm and be supportive; convey that you love them but disapprove of the behavior. Remind them of the rules and expectations that were set and be clear about the consequences. Small consequences are enough to get the point across. Sometimes too severe of a consequence can actually have the opposite effect and cause the teen to act out again in the future. Here are some appropriate consequences listed.

7th page: It is important to be ready for some tough questions. Remember that as their parent you have a lot of influence on their decisions. Sometimes practicing how to answer these tough questions can help. You can go through these questions at home and below each question are some suggestions on how to respond with some open space for you to make them your own.

Always remember that your child's primary care provider is here as a support system for you if you ever have questions or concerns.

Thank you so much for your interest in this educational session. Do you have any questions for me?

Please fill out the post-educational survey and I appreciate any feedback you may have. Thank you so much for your time.

APPENDIX G

PROJECT TIMELINE

Date	Project Phase	Tasks
January-May 2023	Planning	• Review the literature on e-cigarette use in adolescents • Determine best evidence-based practices for vaping education • Identify clinic for project implementation • Prepare project proposal
May-July 2023	Pre-Implementation	• Obtain clinic permission to implement evidence-based vaping education • Preparation of recruitment materials and evidence-based handouts • Creation of pre- and post-educational surveys with review by content experts • Obtain Banner Health Research Determination Committee (RDC) approval
August 28-September 28, 2023	Implementation	• Recruit parents of adolescents aged 11-14 years that present for well-child check • Provide pre-educational survey via QR codes to participating parents • Conduct a short 5-10-minute educational session with parents facilitated by the CATCH My Breath parental toolkit handout • Provide post-educational survey via QR code to participating parents • Collect data from pre- and post-educational surveys
October-November 2023	Evaluation	• Analyze data • Present results to clinic staff and administration • Determine plan for sustainability and dissemination

APPENDIX H

LITERATURE REVIEW GRID

Project Question: Does an evidence-based educational handout and presentation for parents of adolescents aged 11-14 years at Banner Health Center in Queen Creek using the CATCH My Breath initiative increase their knowledge of the health risks associated with electronic cigarettes?

Pub. Year; Author's Last Name	Title of Publication	Type of Study	Main Outcomes of Findings	Support for and or Link to Project
2022; Baker et al.	Vaping prevention in a middle school population using CATCH My Breath	Quasi-experimental	-CATCH My Breath is an evidence-based nicotine prevention program that substantially reduces middle school students' likelihood of vaping	-This is a strongly supported tool that can be used for education and reduces the likelihood of vaping
2021; Becker & Rice	Youth vaping: a review and update on global epidemiology, physical and behavioral health risks, and clinical considerations	Review of evidence	-Ingredients of e-cigarettes -Lung injury when ingredients aerosolized and inhaled -EVALI statistics for 2019 -Ingredients are respiratory irritants (found in bronchoalveolar samples) -Exposure to heavy metals -3 main motivations of vaping for high-school seniors (taste and entertainment, experimentation, replace cigarettes) -Adolescent belief that fruity flavors were less harmful -Initial e-cigarette exposure with fruity flavor progressed use more frequently and faster than unflavored or tobacco	-Significant risks associated with adolescents using electronic cigarettes -Need for more studies on long-term health risks -Important risk information that should be included in education to parents on the health risks their adolescent may face if using e-cigarettes
2018; Case et al.	E-cigarette specific symptoms of nicotine dependence among Texas adolescents	Cross sectional study	-Adolescents who show s/sx of nicotine dependence are less likely to report wanting to quit and are less likely to	-Nicotine dependence is a primary health concern of e-cigarette use

Pub. Year; Author's Last Name	Title of Publication	Type of Study	Main Outcomes of Findings	Support for and or Link to Project
			have attempted to quit within the last year	-Parents of adolescents need to understand the risks associated with nicotine dependence and the challenge of quitting
2022; Cohen et al.	Poor perception and knowledge of electronic cigarettes among adolescents and their parents	Cross sectional study	-Perception and knowledge regarding the content and safety profile of e-cigarettes is poor for both adolescents and parents	-There is a significant need for education for adolescents and their adolescents on the contents and health risks of e-cigarettes
2018; Conner et al.	Do electronic cigarettes increase cigarette smoking in UK adolescents? Evidence from a 12-month prospective study	Cluster randomized controlled trial	-Those who had used e-cigarettes were strongly associated with subsequent initiation and escalation of traditional cigarette use in the next 12 months	-It is important to teach parents that adolescents using e-cigarettes are more likely to then use traditional cigarettes, which also carry dangerous health profiles -Include in parental education that the health risks go beyond that of the e-cigarette use themselves
2020; Evans-Polce et al.	Prospective associations of e-cigarette use with cigarette, alcohol, marijuana, and nonmedical prescription drug use among US adolescents	Cross-sectional study	-18-year-olds who reported e-cigarette use were more likely to report use of alcohol, marijuana, and non-medical prescription drug use at age 19	-Important information for parents to understand and relay to their adolescent children -Teach parents that the effects of e-cigarettes go farther than their direct use -It is important to determine the use of e-cigarettes early to modify their risk of these other risky behaviors that carry their own health risks
2022; Gordon et al.	E-cigarette toxicology	Review of evidence	-Ingredients carcinogenic and increase the risk for lung cancer and oral cancer	-Inform parents of the significant health risks of e-cigarettes

Pub. Year; Author's Last Name	Title of Publication	Type of Study	Main Outcomes of Findings	Support for and or Link to Project
			-E-cigarette use associated with increased dental caries, periodontal disease, and mucosal lesions -Elevated rates of COPD and asthma, even higher with co-use of e-cigarettes and traditional cigarettes -Greater incidence of coronary artery disease, arrhythmias, and MI	-Need more studies on long-term health risks
2018; Jobson et al.	Adolescent nicotine exposure induces dysregulation of mesocorticolimbic activity states and depressive and anxiety-like prefrontal cortical molecular phenotypes persisting into adulthood	Quasi- experimental	-Nicotine dependence has high comorbidity rate with neuropsychiatric conditions like mood and anxiety disorders ->90% of nicotine users started in adolescence—adolescence is a critical period for neurodevelopment -Adolescent brains are particularly sensitive to psychostimulants	-Inform parents of the neurologic and behavioral health effects of nicotine -Inform parents that nicotine affects the brain, especially because they are adolescents and not fully developed
2020; Kelder et al.	A middle school program to prevent e-cigarette use: A pilot study of "CATCH My Breath"	Cohort study	-Students in schools that implemented CATCH My Breath education were half as likely to experiment with e-cigarettes over the next 16 months	-This is an evidence-based educational tool that can be utilized to teach parents of the health risks associated with e-cigarette use -Implementation is best in middle school aged children to provide early prevention prior to the start of a behavior, like e-cigarette use
2022; Mantey et al.	Perceived parental knowledge reduces risk for initiation of nicotine and	Cohort study	-Decreased initiation rate for vaping with increased	-Educate parents that the more they know about e-cigarettes the lower the

Pub. Year; Author's Last Name	Title of Publication	Type of Study	Main Outcomes of Findings	Support for and or Link to Project
	cannabis vaping: A longitudinal study of adolescents		adolescent perceived parental knowledge -Decreased initiation of vaping with increased perceived parental engagement and knowledge of child's location, activities, and peer groups	likelihood their child will use e-cigarettes -Educate parents to be more engaged with their adolescent and be knowledgeable about where they are, what they are doing, and who they are with as this will decrease the likelihood of them vaping
2020; Overbeek et al.	A review of toxic effects of electronic cigarettes/vaping in adolescents and young adults	Review of evidence	-Ingredients, carcinogenic -EVALI -Cardiovascular, immunologic, and neuro-developmental side effects	-Severe risks associated with the contents of e-cigarettes -Need more studies on long-term health risks and carcinogenicity -Important information to include in parental education
2021; Trucco et al.	Do parents still matter? The impact of parents and peers on adolescent electronic cigarette use	Cross-sectional	-Parents actively influence adolescent e-cigarette use	-Parental education does make a difference -Parental engagement can alter adolescent choices
2018; Peterson et al.	Pediatric primary healthcare providers' preferences, experiences, and perceived barriers to discussing electronic cigarettes with adolescent patients	Qualitative structured interviews/Case reports	-Interviews of 25 peds primary care providers (topics that were important to discuss, counseling, strategies for conversations, barriers to discussions) -Important topics: myths, addressing risks, identifying it as a potential gateway substance, emphasizing lac of regulation -Strategies: emphasizing medical uncertainty/risk, motivational interviewing, using outside resources	-Providers generally feel underprepared to have in-depth clinical conversations about e-cigarettes -Need for provider education -Providers think conversations about e-cigarettes are very important, but are restricted by time and a lack of screening tools

Pub. Year; Author's Last Name	Title of Publication	Type of Study	Main Outcomes of Findings	Support for and or Link to Project
			-Barriers: lack of medical knowledge, unfamiliarity with adolescent motivations and slang, inadequate screening tools, lack of time	
2020; US Preventive Services Task Force	Primary care interventions for prevention and cessation of tobacco use in children and adolescents: US Preventive Services Task Force Recommendation Statement	Systematic review	-Systematic review of evidence on benefits and harms of primary care interventions for tobacco use prevention and cessation in children and adolescents -Newly included e-cigarettes -Immediate adverse health effects in child and adolescents including nicotine dependence and toxicity, harm to the developing brain, use as a bridge to conventional cigarette smoking, inhalation of carcinogens -No harms from behavioral counseling interventions -Approximately 1/3-1/2 of children and adolescents who have visited a clinician in the past year were asked about tobacco use and of those who reported use within the last 30 days, only ¼ advised to quit -AAP supports these updated recommendations	-USPSTF recommends that primary care clinicians provide interventions, including education or brief counseling, to prevent initiation of tobacco use among school-aged children and adolescents -Evidence between e-cigarette use in nonsmoking adolescents and subsequent cigarette smoking as young adults -Exposure to nicotine during adolescence harms the developing brain, which can affect function, cognition, attention, and moods -More studies needed to identify effective interventions to help children and adolescents who use tobacco/nicotine products to quit
2019; Polosa et al.	The effect of e-cigarette aerosol emissions on	Review of evidence	-Investigate effects of e-cigarettes, including those	-Need for more long-term studies on health effects of e-cigarettes

Pub. Year; Author's Last Name	Title of Publication	Type of Study	Main Outcomes of Findings	Support for and or Link to Project
	respiratory health: A narrative review		who switched from tobacco cigarettes -E-cigarettes have fewer respiratory risks than traditional tobacco cigarettes -E-cigarettes contain glycerol, propylene glycol, flavorings, metals, and nicotine	- Aerosols from glycerol and propylene glycol have been shown to have irritant effects including chronic airway irritation
2020; Fowles et al.	Cancer and non-cancer risk concerns from metals in electronic cigarette liquids and aerosols	Review of evidence	-Evaluation of metal concentration in e-liquids and e-aerosols from 8 studies -Need for improvement in product design, enforced product safety regulations and manufacturing quality control -Chromium and nickel leading contributors to health risks with cadmium, lead, manganese, and arsenic as minor contributors	-Exposure to metals in e-cigarette liquid and aerosols poses a significant cancer and non-cancer health risk -The heating element is the main source of metals in e-aerosols
2020; Gaiha et al.	Underage youth and youth adult e-cigarette use and access before and during the coronavirus disease 2019 pandemic	Cross-sectional	-Description of people 13-24 years self-reports in changes of use and access to e-cigarettes during covid pandemic -National, online survey of 2,167 youth and young adults ever-users -1198 reported changing amount of e-cigarette use (32.4% quit, 35.3% reduced the amount of nicotine, 17.6% increased nicotine use, 7.8% increased cannabis	-Reduced e-cigarette use or quitting associated with shelter-in-place guidelines -Those younger than 21 reported accessing e-cigarettes from online and retail stores during the pandemic—suggests a need to strengthen prevention including education to teens and sellers and age verification

Pub. Year; Author's Last Name	Title of Publication	Type of Study	Main Outcomes of Findings	Support for and or Link to Project
			use, 6.9% switched to other products) -810 reported reducing or quitting e-cigarettes	
2021; Almeida-da-Silva et al.	Effects of electronic cigarette aerosol exposure on oral and systemic health	Review of evidence	-Nicotine found in e-cigarettes that advertise no nicotine. Some e-cigarettes have as much nicotine as 20 conventional cigarettes -Teens who used e-cigarettes were more likely to smoke conventional cigarettes at 1-year follow up -Poor effects on oral microbiome causing gingival inflammation and increased levels of pro-inflammatory cytokines -EVALI is a significant risk to the adolescent population -Discussion about third-hand smoke/aerosols that was first described in 2009, particularly important for children (crawling, hand-to-mouth, exploratory habits) -Third-hand smoke/aerosols describes residue and particles that cling to nearby surfaces like clothing, bags, skin, hair, furniture, carpet, floors	-Second-hand aerosols harmful and have cancer-causing agents (40% of children regularly exposed to second-hand smokes/aerosols in 2004) -Second-hand aerosols found to be transferred from a vape shop to a nearby businesses in a multiple-tenant retail building -Increased risk of respiratory symptoms, obesity, disorders of the ear, nose, throat, and sleep-disordered breathing with second-hand aerosols -Third-hand aerosols can cause DNA damage and increase the risk for short and long-term health problems like asthma and cancer

APPENDIX I

OTHER DOCUMENTS AS APPLICABLE TO THE PROJECT (CONTENT EXPERT EVALUATION FORM)

Expert Evaluation Form: *CATCH My Breath* Parental Toolkit and Surveys

Expert Reviewer Name: [redacted]

1. The concepts addressed in the "*CATCH My Breath* Parental Toolkit" education handout are factual and easy to follow.
   a. Strongly agree
   b. Agree
   c. Disagree
   d. Strongly disagree

2. The information in the "*CATCH My Breath* Parental Toolkit" handout will be useful for parents of infants.
   a. Strongly agree
   b. Agree
   c. Disagree
   d. Strongly disagree

3. The pre-intervention and post-intervention surveys are written in language that would be easily understood by a community member who is not a healthcare provider.
   a. Strongly agree
   b. Agree
   c. Disagree
   d. Strongly disagree

4. The information and recommendations provided in the "*CATCH My Breath* Parental Toolkit" handout represent safe, evidenced-based guidelines on e-cigarettes for parents of adolescents aged 11-14 years of age.
   a. Strongly agree
   b. Agree
   c. Disagree
   d. Strongly disagree

5. How many years have you been in practice?
   6

6. In what capacity have you worked with adolescents and parents regarding e-cigarettes?
   Review at well visits.

7. Please provide any additional concerns/comments that you have regarding the "*CATCH My Breath* Parental Toolkit" educational handout and pre-/post-intervention surveys (i.e. any additional information or recommendations/interventions that should be included, changing wording, etc).
   No changes at this time.

REFERENCES

Almeida-da-Silva, C. K. C., Dakafay, H. M., O'Brien, K., Montierth, D., Xiao, N., & Ojcius, D. M. (2021). Effects of electronic cigarette aerosol exposure on oral and systemic health. *Biomedical Journal, 44*(3), 252-259. https://doi.org/10.1016/j.bj.2020.07.003

American Academy of Pediatrics. (AAP). (2019). *Screening adolescents for e-cigarette use in clinical practice.* https://downloads.aap.org/AAP/PDF/2B_Screening_Adolescents_for_E-cigarette_Use_in_Clinical_Practice.pdf?_ga=2.209166358.50849866.1675654502-1459511852.1630529814

American Association of Colleges of Nursing. (2006). *The essentials of doctoral education for advanced nursing practice.* https://www.aacnnursing.org/Portals/0/PDFs/Publications/DNPEssentials.pdf

Arizona Criminal Justice Commission. (2022). *Statistical analysis center Arizona youth survey.* https://www.azcjc.gov/Programs/Statistical-Analysis-Center/Arizona-Youth-Survey

Baker, K. A., Campbell. N. J., Noonan, D., & Derouin, A. (2022). Vaping prevention in a middle school population using CATCH My Breath. *Journal of Pediatric Health Care, 36*(2), 90-98. https://doi.org/10.1016/j.pedhc.2021.07.013

Becker, T. D. & Rice, T. R. (2021). Youth vaping: A review and update on global epidemiology, physical and behavioral health risks, and clinical considerations. *European Journal of Pediatrics, 181,* 453-462. https://doi.org/10.1007/s00431-021-04220x

Case, K. R., Mantey, D. S., Creamer, M. R., Harrell, M. B., Kelder, S. H., & Perry, C. L. (2018). E-cigarette specific symptoms of nicotine dependence among Texas adolescents. *Addictive Behaviors, 84*(September), 57-61. https://doi.org/10.1016/j.addbeh.2018.03.032

CATCH My Breath. (n.d.). *Catch my breath evidence-based vaping prevention program.* https://catch.org/program/vaping-prevention/

Centers for Disease Control and Prevention. (CDC). (2022, November 10). *Quick facts on the risks of e-cigarettes for kids, teens, and young adults.* https://www.cdc.gov/tobacco/basic_information/e-cigarettes/Quick-Facts-on-the-Risks-of-E-cigarettes-for-Kids-Teens-and-Young-Adults.html#one

Cohen, N., Jeter, J., Schissler, K., Lozano, J., Maniaci, V., & Pena, B. (2022). Poor perception and knowledge of electronic cigarettes among adolescents and their parents. *Pediatric Emergency Care, 38*(2), 709-713. https://doi.org/10.1097/PEC.0000000000002339

Conner, M., Grogan, S., Simms-Ellis, R., Flett, K., Sykes-Muskett, B., Cowap, L., Lawton, R., Armitage, C.J., Meads, D., Togerson, C., West, R., & Siddiqi, K. (2018). Do electronic cigarettes increase cigarette smoking in UK adolescents? Evidence from a 12-month prospective study. *British Medical Journal, Tobacco Control, 2* (4), 365-372. https://doi.org/10.1136/tobaccocontrol-2016-053539

Evans-Polce, R. J., Patrick, M. E., McCabe, S. E., & Miech, R. A. (2020). Prospective associations of e-cigarette use with cigarette, alcohol, marijuana, and nonmedical prescription drug use among US adolescents. *Drug and Alcohol Dependence, 216,* 108303. https://doi.org/10.1016/j.drugalcdep.2020.108303

Fowles, J., Barreau, T., & Wu, N. (2020). Cancer and non-cancer risk concerns from metals in electronic cigarette liquids and aerosols. *International Journal of Environmental Research and Public Health, 17*(6), 2146. https://doi.org/10.3390/ijerph17062146

Gaiha, S. M., Lempert, L. K., & Halpern-Felsher, B. (2020). Underage youth and young adult e-cigarette use and access before and during the coronavirus disease 2019 pandemic. *JAMA Network Open, 3*(12), e2027572. https://doi.org/10.1001/jamanetworkopen.2020.27572

Gordon, T., Karey, E., Rebuli, M. E., Escobar, Y. H., Jasper, I., Chen, L. C. (2022). E-cigarette toxicology. *The Annual Review of Pharmacology and Toxicology, 2022*(62), 301-322. https://doi.org/10.1146/annurev-pharmtox-042921-084202

Institute for Healthcare Improvement. (IHI). (2022). *How to improve*. http://www.ihi.org/resources/Pages/HowtoImprove/default.aspx

Jobson, C. M., Renard, J., Szkudlarek, H., Rosen, L. G., Pereira, B., Wright, D. J., Rushlow, W., Laviolette, S. R. (2018). Adolescent nicotine exposure induces dysregulation of mesocorticolimbic activity states and depressive and anxiety-like prefrontal cortical molecular phenotypes persisting into adulthood. *Cerebral Cortex, 29*(7), 3140-3153. https://doi.org/10.1093/cercor/bhy179

Kelder, S. H., Mantey, D. S., Dusen, D. V., Case, K., Haas, A., & Springer, A. E. (2020). A middle school program to prevent e-cigarette use: A pilot study of "CATCH My Breath." *Public Health Reports*, *135*(2), 220-229. https://doi.org/10.1177/0033354919900887

Mantey, D. S., Clendennen, S. L., Springer, A. E., & Harrell, M. B. (2022). Perceived parental knowledge reduces risk for initiation of nicotine and cannabis vaping: A longitudinal study of adolescents. *American Journal of Health Promotion, 36*(4), 623-632. https://doi.org/10.1177/08901171211061941

Overbeek, D. L., Kass, A. P., Boyer, E. W., & Casey, A. M. (2022). A review of toxic effects of electronic cigarettes/vaping in adolescents and young adults. *Critical Reviews in Toxicology, 50*(6), 531-538. https://doi.org/10.1080/10408444.2020.1794443

Peterson, E. B., Fisher, C. L., & Zhao, X. (2018). Pediatric primary healthcare providers' preferences, experiences and perceived barriers to discussing electronic cigarettes with adolescent patients. *Journal of Communication in Healthcare, 11*(4), 245-251. https://doi.org/10.1080/17538068.2018.1460960

Polosa, R., O'Leary, R., Tashkin, D., Emma, R., & Caruso, M. (2019). The effect of e-cigarette aerosol emissions on respiratory health: A narrative review. *Expert Review of Respiratory Medicine, 13*(9), 899-915. https://doi.org/10.1080/17476348.2019.1649146

Rosenstock, I. M. (1974). Historical origins of the health belief model. *Health Education Monographs, 2*(4), 328-335. https://doi.org/10.1177/109019817400200403

Rosenstock, I. M., Strecher, V. J., & Becker, M. H. (1988). Social learning theory and the health belief model. *Health Education Quarterly, 15*(2), 175-183. https://doi.org/10.1177/109019818801500203

Sutton, S. (2001). Health behavior: Psychosocial theories. *International Encyclopedia of the Social & Behavioral Sciences*, 6499-6506. https://doi.org/10.1016/BO-08-043076-7/03872-9

Trucco, E. M., Cristello, J. V., Sutherland, M.T. (2021). Do parents still matter? The impact of parents and peers on adolescent electronic cigarette use. *Journal of Adolescent Health, 68*(4), 780-786. https://doi.org/10.1016/j.jadohealth.2020.12.002

Truth Initiative. (2022, February 20). *What vape products are still allowed under the new e-cigarette policy?* https://truthinitiative.org/research-resources/emerging-tobacco-products/what-vape-products-are-still-allowed-under-new-e

US Food & Drug Administration. (FDA). (2023, June 7). *Cigarettes*. https://www.fda.gov/tobacco-products/products-ingredients-components/cigarettes

US Food & Drug Administration. (FDA). (2020, January 2). *FDA finalizes enforcement policy on unauthorized flavored cartridge-based e-cigarettes that appeal to children, including fruit and mint.* https://www.fda.gov/news-events/press-announcements/fda-finalizes-enforcement-policy-unauthorized-flavored-cartridge-based-e-cigarettes-appeal-children

US Food & Drug Administration. (FDA). (2022, October 6). *New data show more than 2.5 million U.S. youth currently use e-cigarettes.* https://www.fda.gov/news-events/press-announcements/new-data-show-more-25-million-us-youth-currently-use-e-cigarettes

US Food & Drug Administration. (FDA). (2020, January 15). *Newly signed legislation raises federal minimum age of sale of tobacco products to 21.* https://www.fda.gov/tobacco-products/ctp-newsroom/newly-signed-legislation-raises-federal-minimum-age-sale-tobacco-products-21

US Preventive Services Task Force. (USPSTF). (2020). Primary care interventions for prevention and cessation of tobacco use in children and adolescents: US preventive services task force recommendation statement. *JAMA, 323*(16), 1590-1598. https://doi.org/10.1001/jama.2020.4679