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Educating Staff Nurses on E-cigarette and Vaping Associated Lung Injury

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This is to certify that the doctoral study by

Dana Janette Imaoka

has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
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Walden University
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Abstract

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by

Dana Imaoka

MSN, Walden University, 2010

AASN, William Rainey Harper College, 2005

BFA, Northern Illinois University, 1987

Project Submitted in Partial Fulfillment

of the Requirements for the Degree of

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Abstract

Vaping product use has gained popularity since the first device was marketed in the early 2000s. Use among the adolescent and teen populations has grown steadily to the point of becoming an epidemic. As the largest group of healthcare professionals, nurses have the most contact with patients in healthcare settings and are in the position of providing care and education to them. The purpose of this doctoral project was to increase knowledge of vaping product use as well as the growing number of e-cigarette- and vaping-associated lung injuries (EVALI) in the United States. A gap was identified in nurses' knowledge in a local community hospital in Northern Illinois. The project was developed to answer the question of whether educating staff nurses on e-cigarettes and EVALI would lead to increased knowledge. The development of the project was based on the analysis, design, development, implementation, and evaluation (ADDIE) model. Twenty-seven nurses from intensive care and step-down and the intermediate and pediatric units initially chose to participate in the education. A 20-question presurvey using a survey from a prior study was developed to assess demographic information and knowledge of vaping and EVALI prior to the intervention; a 16-question postsurvey was administered after the education to assess knowledge. Twenty-seven nurses completed the presurvey and attended the education; however, 13 nurses completed the postsurvey. Results calculated using an unpaired *t* test showed that there was an increase in knowledge between 46% to 54% post survey. The findings of this project indicate that nurses can use evidence-based practices regarding vaping product use, risks, and dangers of vaping, as well as lung injury to educate patients. This knowledge has the potential to create positive social change in patient settings as well as in the community.

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Dedication

This project is dedicated to my son and his health and well-being. You are my daily source of inspiration, and I only want the best for you in your life, now and always. Good luck in your future and remember to heed my experience and wisdom. The time is now to inspire others and help them to quit or never start.

I would also like to dedicate this to my mother, Linda Dierks, and to my mom's best friend whom I called Aunt, Arlene Tonne Strand, RN. These women were my guiding force to go into nursing. I lost my mom during my first semester in nursing school, and my aunt was there at my graduation and pinning. Thanks to both, who are now gone, for your inspiration and making me the woman and nurse that I am today.

My father, Donald Dierks, taken too soon, he was so proud of me when I graduated nursing school from Harper College, and prouder when I was completing my master's degree. He was looking forward to my graduation in his home state of Minnesota but was taken too soon.

Lastly, and most importantly, to my husband, Paul, and to his children, who came into my life and have brought me happiness and support to go back to nursing, to raise our youngest son, and to continue my journey through my master's and on to this doctoral degree. Especially to Erica, you have become a great source of pride in becoming a nurse, and your doctoral journey inspired me to get back to mine and complete it. We will celebrate together soon at the end of this journey.

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To Dr. Dorothy Shapiro, Nancy Nozicka, and Dave Chilicki for working with me through my practicum and field experiences for my DNP, and a shout out to the nurses who participated in or helped me with my project. Brandon Verwijst, thank you for your statistical expertise. Thanks for Stephanie Risch for helping with TEAMS meetings. Thank you to Rachel Dahm. If you had not hired me, I may not have continued.

To Dr. Diane Whitehead, you may not remember, but I do. You were very supportive as I completed my master's program during my father's funeral. I will never forget. Thank you.

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Most important, to my chairperson, Dr. Anna Hubbard, thank you for your time, patience, and guidance through the final stages of this journey.

I would not be where I am today without all of you and my family.

Thank you from the bottom of my heart for standing by me through this amazing journey. In the words of Walt Disney, “Keep moving forward, opening new doors, and doing new things!”

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Section 1: Nature of the Project

Introduction

Individuals have been coming up with creative ways to smoke for years; however, the first e-cigarette is credited as coming into use around 2003, and the prevalence of e-cigarette use is rapidly increasing, especially among adolescents, teens, and young adults due to a variety of flavor additives (Centers for Disease Control and Prevention [CDC], 2016). Although vaping or using electronic cigarettes has become more popular in the years since the tools were first introduced as an alternative to traditional tobacco products and touted as a method to quit smoking, which has increased its popularity, the dangers of vaping are starting to become clearer with time (Ghosh & Bradley Drummond, 2018). As of February 2020, more than 2,800 cases of severe lung injury related to vaping had been confirmed related to additives in the vape juice (CDC, 2020a). The gap in nursing practice is clear as staff nurses in Northern Illinois in an intermediate and intensive care unit and the step-down and pediatric unit at a local hospital are not aware of current findings related to vaping and product-use-associated lung injury. This project may impact social change as educating staff nurses on e-cigarette- and vaping-associated lung injury (EVALI) has the potential to reduce morbidity and mortality. Nurses who are educated on EVALI can provide information to patients and families on the negative effects of this behavior.

Problem Statement

Local Nursing Practice Problem

A community in Northern Illinois has seen lung-associated injury due to vaping because the issue was brought to the media when late in 2019, a teen was brought to the

hospital with lungs so damaged that they were compared to those of a 70-year-old (Thayer, 2019). As the popularity of vaping has grown, the number of vapers under the age of 25 has grown, with children starting as young as middle school. Although the number has decreased over the last year, the CDC (2020c) noted that electronic cigarettes have been the most common form of tobacco use among middle and high school students since 2014, with 1 in 20 middle-school-aged students and 1 in 5 high school students reporting use. In fact, despite the claim of decreased use last year, Anzel (2020) noted that a survey found that nearly half of high school students in Illinois used electronic cigarettes within the last year. Furthermore, Selle (2019) noted that respiratory illnesses and deaths related to vaping had been increasing, with five out of 47 deaths being from Illinois. Understanding the newly diagnosed respiratory illness known as EVALI is becoming more important to healthcare workers. Nurses at one Northern Illinois hospital are the frontline of patient care and must understand this disease to aid doctors with treatment and provide care for these individuals.

Need to Address Problem

The gap in nursing practice is clear as staff nurses in Northern Illinois in an intermediate and intensive care unit and the step-down and pediatric unit at a local hospital are not aware of the current findings related to vaping and product-use-associated lung injury. Traditional smoking cessation questions asked in the hospital have not included vaping, or patients may simply be asked, “Do you smoke,” and it is left at that. As with vitamin supplements that go underreported by patients because they do not think of it as medication, people may not consider themselves to be smokers if they vape because they have been told that it is not like using regular tobacco such as cigarettes or

cigars. During the admission process to the hospital, nurses are supposed to screen patients for tobacco or any type of smoking use; however, Smith et al. (2013) noted that while hospitals should have this important health screening in place, there are no uniform questions regarding the screening process. In a study conducted by Wagner et al. (2019), while overall screening for tobacco use was high, the addition of a vaping screen increased reporting of e-cigarette use. To educate patients regarding the dangers of vaping and the benefits of cessation, nurses must be educated themselves. With the rising epidemic of youth vaping, it is important to continually provide education on the topic of vaping to the younger population, regardless of whether they are using or not.

Significance to Nursing Practice

This project proposed education for staff nurses in Northern Illinois in an intermediate and intensive care unit and the step-down and pediatric unit regarding EVALI, with the overall intent for nurses to educate patients, families, and the public as to the dangers of vaping. Nurses are the primary stakeholders, as continuing education is important to nursing practice in a dynamic, ever-changing profession, and remaining current with up-to-date knowledge regarding specialty care is important to improve the safety, quality, and efficacy of patient care and produce positive outcomes. Secondly, management and administration are stakeholders to support this education effort for nursing to improve patient care and reduce costs of care. Stakeholders in this intervention include teachers, parents, and family members as well, as they need to be encouraged to become educated concerning the dangers of vaping to help others stop this habit.

Purpose

Gap in Practice

How can nurses curb the growing problem of vaping in the world today? To accomplish such a feat, nurses must continually be educated on new trends in healthcare and understand what a disease or problem entails. In the case of vaping, as with smoking, nurses must understand the dangers related to this behavior and the possible effects that vaping has on the human body. To educate others, one must possess knowledge that can be shared and explained. The gap in nursing practice is clear as staff nurses in Northern Illinois in an intermediate and intensive care unit and the step-down and pediatric unit at a local hospital are not aware of the current findings related to EVALI.

Addressing the Gap

This project will attempt to answer the following question: Will educating staff nurses on EVALI increase knowledge? Vaping is relatively new, and not all the dangers are at the surface; however, in recent years, healthcare professionals have been starting to see serious adverse effects on the human body related to vaping. This project has the potential to address this gap in practice in several ways. To slow this growing epidemic, nurses must understand the basics of vaping and what it is in terms of chemical composition. Second, nurses must recognize the dangers of inhalation, much as with tobacco products. Third, many people insist that vaping is safer than cigarettes because it does not have the same makeup; however, electronic cigarettes or pods may have up to 10 times the nicotine as traditional cigarettes (Zeblisky, 2018). Fourth, nurses must understand the illnesses that can be caused related to vaping. Lastly, nurses must know the resources and tools to educate others regarding cessation. With this combined

knowledge, nurse will be able to begin to educate patient populations to the dangers of vaping and vaping-related illnesses and discuss methods for cessation.

Nature of the Doctoral Project

Sources of Evidence

To commence the project, a literature review was conducted using databases available through Walden University and the hospital, which included but were not limited to CINAHL, MEDLINE, PubMed, ProQuest, Ovid, and Cochrane Database of Systematic Reviews. Keywords and phrases for the literature search included but were not limited to *vaping*, *EVALI*, *lung injury*, *teens*, *e-cigarettes*, and *dangers of vaping*. Articles referenced were from the last 10 years from 2011–2021 and needed to include references to dangers regarding vaping, the prevalence of teen vaping, lung injury related to vaping product use, and the prevalence of EVALI. Information for the middle school, high school, and young adult age groups—or ages 11 through 25 years—was included and adults over the age of 25 were excluded. Permissions and approvals were obtained from Walden University's Institutional Review Board (IRB) as well as the facility's IRB as necessary. Information regarding the issue of EVALI was compiled, and with the collaboration of clinical nurse specialists and physicians at the hospital as well as the unit managers, education was constructed for the nursing team regarding EVALI.

Approach to Project

Prior to curriculum design, approval was obtained from the IRB at Walden University as well as the hospital site where the project would be conducted, as required. Along with experts who included pulmonologists and an advanced practice nurse in pulmonology, a pediatrician affiliated with the hospital system agreed to collaborate on

the project details. To provide a curriculum to meet the needs of the nurses to be educated, a pretest was administered to the nurses to understand what was currently known by them regarding EVALI and its treatments. A pretest was used to determine nurses' knowledge of vaping and e-cigarettes prior to the class. The evaluation tool (Appendix A) for the pretest was adapted from a tool that was used in a cross-sectional study conducted by Mbe et al. (2017). Permission for its use was granted by Dr. Ayodele via email (Appendix D). The link for the pretest was sent via email to participants with informed consent and the purpose of the study. This tool measured participant demographics as well as knowledge regarding the use of e-cigarettes.

The curriculum was designed with input from content experts using the analysis, design, development, implementation, and evaluation (ADDIE) method. The class was planned to be 60 to 90 minutes in length; the class length was determined to best meet the needs of learners. A posttest was administered to the nurses to assess the learners' knowledge after education. Descriptive statistics from the results of the test were used to analyze the data.

Purpose of Project

The practice problem was the gap in nursing knowledge regarding the dangers of vaping and associated lung injury and illness. The CDC (2020b), the U.S. Surgeon General (2020), The American Nurses Association (ANA, 2020), and The American Medical Association (AMA; Steenhuysen, 2019) are among the most reputable sources working to support education regarding vaping and EVALI. This project was a step in one suburban hospital to educate nurses so that they may effectively educate patients and families and perhaps, in time, the surrounding communities to the dangers of vaping and

its effects. Nurses have the obligation to protect patients and the community and to advocate for their health.

Significance

Stakeholders

Individuals who will benefit from this project designed to educate nurses as to the dangers of vaping so that they may educate their patients include nursing staff, patients, and family members. According to Bergh et al. (2015), educating patients is an important role in nursing that helps patients understand and be able to manage health issues; however, it is important that nurses are educated to educate as well as stay current in practice. The first beneficiaries of the project will be nurses, who will impart their learned knowledge to patients and families. Patients may benefit from the project through improved knowledge of the dangers of vaping that may affect their health and well-being and will receive cessation education as needed. Furthermore, Bergh et al. noted that educating patients can have financial implications for health care systems, and therefore, it is important that nurses have the knowledge they need to educate patients. Health care administration, nursing staff, patients, and patients' families will all benefit from education pertaining to the dangers of lung-associated injuries related to the use of vaping products. In turn, the education project could eventually lead to community education at schools for teachers and students. In a survey conducted by United Healthcare (2019), many respondents indicated that wellness programs had made a positive impact on their health, and 8% of employees noted that such programs had helped them stop using tobacco or nicotine products, which is one of the top priorities to get healthy.

Contributions to Nursing Practice

Remaining current in nursing practice and current trends in health is extremely important for nurses to effectively perform their job duties and to provide safe, effective, high-quality care to their patients. Therefore, receiving education regarding the growing health concerns surrounding vaping is vital to nursing practice regarding pulmonary care and the overall health of patients. A study performed by Akpor and Eweiye (2016) found that it is necessary for nurses to educate patients regarding smoking cessation and the dangers of smoking. In relation to vaping, which is a newer form of smoking, nurses must learn about the dangers of vaping to adequately educate patients regarding the risks and health factors associated with this habit. Pope et al. (1995) noted that is important for nurses to be lifelong learners to understand patient needs, to provide quality care, and to remain current in practice.

Transferability to Other Practices

The curriculum to educate nurses regarding EVALI was intended to be piloted on the intensive care unit (ICU), intermediate, step-down, and pediatric medical surgical units. However, as vaping is a concern for younger generations, especially in the age group of 18- to 29-year-olds, it is important that the program has the transferability to be implemented on other medical-surgical units until all nurses in the hospital system have been educated. Many hospital systems have computer class trainings in which the education program can be incorporated so that it can be a requirement for new nurses entering the system. The in-person education program can be integrated into a competency program. New information can be implemented as it becomes available to

educate nurses who would like to remain current in practice and take the course as a refresher as well.

Implications for Social Change

This project may impact social change, as educating staff nurses on EVALI has the potential to reduce morbidity and mortality. As a start to reducing these risks, health assessment and discharge guidelines have been created by the CDC (Appendix A) that can aid nurses and providers (Huey et al., 2020). Nurses who are educated on EVALI can provide information during the hospital stay to patients and families on the negative effects of this behavior, and the CDC guidelines can aid in assessing discharge readiness. Nurses strive to protect and promote health and well-being for the communities that they serve, thus working toward social change. Educated about the dangers of vaping, nurses may go forth and affect change in people's lives as well as in schools, communities, and towns by educating individuals and providing resources for vaping cessation.

Summary

This DNP project was designed to address a knowledge gap for staff nurses in Northern Illinois regarding the dangers of vaping. The focus of the project is educating nurses from the intensive care, intermediate, step-down, and pediatric medical-surgical units at a local hospital regarding the danger of EVALI. A literature review was conducted, and the appropriate approvals from the IRBs of Walden University and the project site were obtained, along with permissions from the participants of the program. The project may contribute to nursing practice through education for nurses to address an issue that is evolving, in addition to having a social impact through the promotion of healthy behaviors in communities to address vaping and cessation with patients.

Section 2 of this proposal addresses the ADDIE model in its application to the project along with the relevance of the project to advanced nursing practice. My role as the DNP student as well as the roles of team members who contributed to the education piece of the project are discussed. The following section also addresses how the state of Illinois is addressing the concerns and growing problem of vaping. By examining vaping and associated lung injury through evidence and information, this doctoral project has the potential to impact the practice of nursing as it seeks to educate nurses regarding vaping dangers so that they may move forward to provide education and intervention for patients who have the potential to succumb to EVALI.

Section 2: Background and Context

Introduction

According to a report from the U.S. Surgeon General (2016), the prevalence of vaping in children in Grades 6–12 has steadily increased. As of January 2020, cases of EVALI had been reported in all 50 states and Puerto Rico, and while the numbers peaked in September 2019, much more research needs to be conducted on suspected causes of vaping as well as the long-term effects of vaping on the body (CDC, 2020b). Through this project, I have attempted to answer the following question: Will educating staff nurses on EVALI increase knowledge?

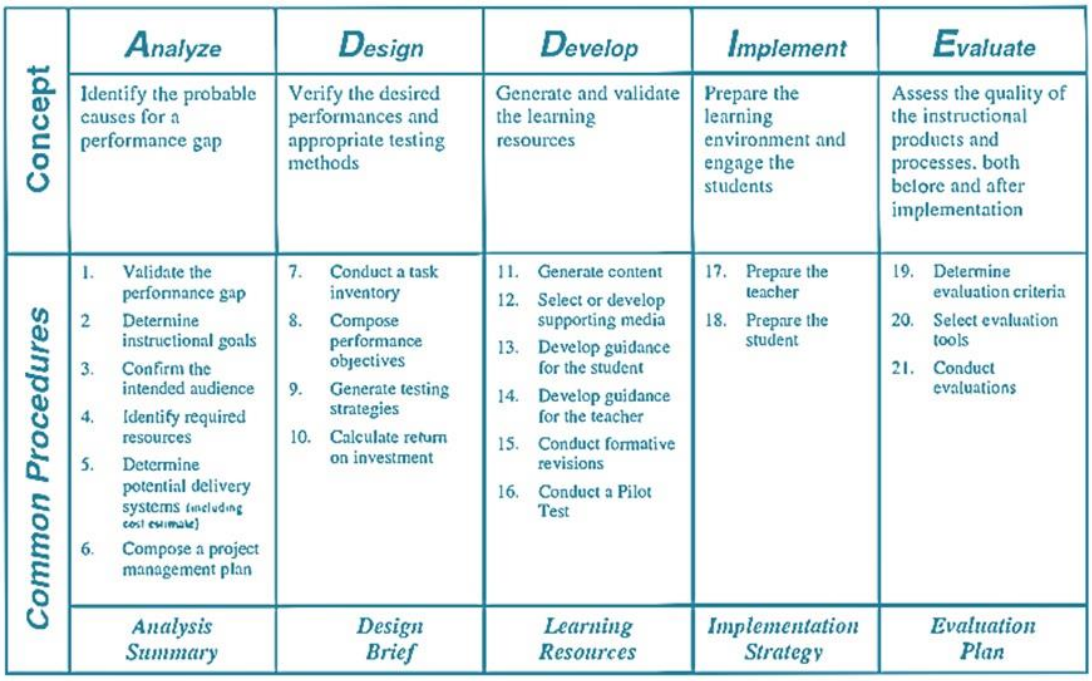
Nurses at a local hospital in Northern Illinois require education to address this growing epidemic and the new diagnosis of EVALI. This project will address the need to educate nurses in the intensive care, intermediate, step-down, and pediatric medical-surgical units of a local hospital in Northern Illinois regarding the dangers of vaping and specifically EVALI. In this section, in addition to addressing the project's relevance to nursing practice, I describe the model on which the project was designed, relevant roles of myself and the team, and how the state and facility are addressing the problem of vaping.

Concepts, Model, and Theories

One of the most popular models for learning is the ADDIE model. The acronym ADDIE stands for analysis, design, development, implementation, and evaluation. According to Branch (2009), ADDIE is a valid process that involves generating and applying concepts and theories using five components and is used to construct knowledge and skills through guided learning. See Figure 1.

Figure 1

Common Instructional Design Procedures in the Analyze, Design, Develop, Implement, and Evaluate (ADDIE) Model



Concept	Analyze	Design	Develop	Implement	Evaluate
	Identify the probable causes for a performance gap	Verify the desired performances and appropriate testing methods	Generate and validate the learning resources	Prepare the learning environment and engage the students	Assess the quality of the instructional products and processes. both before and after implementation
Common Procedures	1. Validate the performance gap 2 Determine instructional goals 3. Confirm the intended audience 4. Identify required resources 5. Determine potential delivery systems (including cost estimate) 6. Compose a project management plan	7. Conduct a task inventory 8. Compose performance objectives 9. Generate testing strategies 10. Calculate return on investment	11. Generate content 12. Select or develop supporting media 13. Develop guidance for the student 14. Develop guidance for the teacher 15. Conduct formative revisions 16. Conduct a Pilot Test	17. Prepare the teacher 18. Prepare the student	19. Determine evaluation criteria 20. Select evaluation tools 21. Conduct evaluations
	Analysis Summary	*Design Brief*	*Learning Resources*	*Implementation Strategy*	*Evaluation Plan*

Note. From *Instructional Design: The ADDIE Approach* (p. 3), by R. M. Branch, 2009, Springer (https://doi.org/10.1007/978-0-387-09506-6). Copyright 2009 by Springer Science+Business Media, LLC. Reprinted with permission. Appendix D

This model is being used for the development of nursing education regarding EVALI to address a gap of knowledge regarding the prevalence, dangers, and consequences of vaping in teens and young adults, including, but not limited to, JUUL pods, nicotine content, and other additives, to recognize the devices used for vaping as well as potential lung injury or disease. Cheung (2016) noted that ADDIE education is presented in an appropriate manner that optimizes learning. I sought to develop this

project to be effective in enhancing nursing knowledge and practice to address a health issue and methods that can affect patient and community health outcomes.

Definitions

Terms that are associated with vaping pertain to the electronic devices that are used; the cartridges or pods that contain the vape liquid, some of which contain nicotine but can also be used for marijuana; additives; and manufacturer terms. Definitions of key terms are as follows:

E-cigarette: A device that has a power source with a heating element that is used to heat a liquid to produce aerosol that is inhaled.

Pod and/or *cartridge*: Term used for the device that holds the vape liquid or "juice," which contains additives that may or may not include nicotine, flavoring, or THC (tetrahydrocannabinol found in marijuana), as well as other chemicals. Some pods can be filled with homemade blends.

JUUL: Name of the manufacturer of a the most popular and common brand of e-cigarette, commonly referred to as JUUL. The JUUL device was introduced in 2015 and looks like a USB flash drive. JUUL pods are known to contain high amount of nicotine. One JUUL pod can contain as much nicotine as 20 cigarettes. JUUL devices use nicotine salts to allow easier inhalation and less irritation than traditional tobacco products.

Nicotine/nicotine salts: An additive in vape juice; toxic substance derived from tobacco. Acts as a stimulant. The CDC (2021) found that 99% of e-cigarettes contain nicotine. Can harm adolescent brains. May increase risk of addiction to other drugs in the person's future.

Additives: Chemicals added to vape juice such as THC, nicotine, flavoring, and other compounds, which may include benzene, vitamin E-acetate, polyethylene glycol, or other chemicals. Materials may vary by manufacturer.

E-cigarette- and vaping-associated lung injury (EVALI): Medical diagnosis in individuals with a history of vaping within 90 days prior to symptoms. Imaging such as chest x-ray or computed tomography (CT) scan demonstrates injury to lung. May or may not have infectious process that is believed to have caused the injury; no other plausible diagnoses are relevant (Boyer et al., 2020; CDC, 2021; Weatherspoon, 2018).

Electronic nicotine delivery systems (ENDS): E-vaporizers, vape pens, e-hookahs, e-cigarettes, and e-pipes that use a heating element to create aerosol from a liquid to be inhaled (McGee & Goldschmidt, 2019).

Relevance to Nursing Practice

Nurses are the frontline healthcare workers for patients in the hospital setting. It is important for nurses to remain current in practice through continuing education efforts as well as current with skills needed to perform their job duties. Ongoing education enables nurses to remain current with new developments in care, such as those for patients suffering with lung injury as result of vaping or vaping product use. The implementation of evidence-based practice must address the knowledge deficit for nurses regarding vaping and EVALI. This project addresses methods to improve education and address the gap in nursing practice regarding vaping and EVALI. Nurses play a significant role as educators regarding matters of health, and as such, they need programs regarding vaping, electronic cigarettes, and dangers such as EVALI, which can educate and prepare them to better serve their patients (Hwang et al., 2020).

Research

A literature review using the databases available through Walden University library as well as the hospital, including sources such as CINAHL, MEDLINE, PubMed, ProQuest, Ovid, and Cochrane Database of Systematic Reviews, was conducted to determine the widespread use of vaping as well as its dangers and consequences. Keywords and phrases for the literature search such as *vaping*, *EVALI*, *lung injury*, *teens*, *e-cigarettes*, and *dangers of vaping* were used to find relevant information regarding vaping and EVALI. Evidence and cases within the last 10 years, from 2011-2021, referenced dangers regarding vaping, the prevalence of teen vaping, lung injury related to vaping product use, and the prevalence of EVALI.

Knowledge Deficit

As vaping is a newer growing concern in healthcare, ongoing education is needed to address the knowledge gap concerning it. Although one of the duties of a nurse is to educate patients, Hwang et al. (2020) noted that providers report a low level of knowledge regarding vaping as well as associated health implications of use. Nurses in the intensive care, intermediate, and pediatric units at a Northern Illinois facility have seen recent admissions of patients presenting with lung injury related to vaping. Therefore, it is necessary to address what can be done to improve the knowledge of the EVALI disease process, as well as address patient education and prevention of further vaping product use by patients. In a study to determine knowledge and perceptions of e-cigarettes, Franks et al. (2017) determined that despite widespread knowledge about the existence of electronic cigarettes, more needs to be accomplished, including the incorporation of information regarding e-cigarettes in curricula as well as preparation for

health professionals to effectively educate patients regarding e-cigarette use and associated outcomes. Huey et al. (2020) noted that "nurses play a critical role in providing discharge education," and they can partner with schools and the community, advocate for legislation to stop vaping, and "use best practices in clinical decision-making" (p. 3) when counseling patients regarding vaping.

As the prevalence of vaping has increased among adolescents and teens, it is important for nurses, especially those specializing in pediatrics, to have knowledge regarding screening for the use of ENDS and health risks such as EVALI, as well as have the means to educate patients on the risks of nicotine, especially for individuals under age 25 and to provide adequate cessation counseling (McGee & Goldschmidt, 2019).

Recommendations and Strategies

Through this Doctor of Nursing Practice (DNP) project, I strive to address the gap in nursing practice and the knowledge deficit regarding EVALI. Education for nursing staff will be developed and implemented to address the knowledge gap regarding vaping product use, dangers related to vaping, and the potential effects of lung injury known as EVALI. The project will address the current knowledge of staff nurses as well as educate nurses regarding vaping products, chemical contents of the pods used for vaping, and the dangers associated with vaping. Huey et al. (2020) noted that nurses' duties include providing discharge information to patients that can prevent readmissions and impact patient outcomes by reducing risks associated with morbidity and mortality and suggested using the following four-step method to intervene in the public health crisis related to vaping:

1. *Ask*: Conduct a thorough assessment that includes questions related to vaping in addition to smoking, using patient-centered communication that includes open-ended questions and active listening while minimizing interruptions.
2. *Inform*: Partner with schools and parents to educate communities about the rising problem of vaping. Counsel and support patients with cessation efforts and provide resources.
3. *Advocate*: Although many localities are banning advertising or sales of certain vape products, nurses can continue to work with legislators in an effort to fund research as well as regulate products.
4. *Research*: Nurses must continue to implement evidence-based practice regarding e-cigarettes, vaping, dangers of product use, and subsequent health-associated risks.

Through this project, I not only strive to educate nurses regarding EVALI, but also seek to provide education and resources to better educate patients who vape, provide support to quit, and introduce tools for nurses to use for assessment and discharge, such as those found in Appendix A.

Local Background and Context

State Efforts

Despite an Illinois ban on the sale of tobacco and vaping products in July 2019, the Illinois Department of Public Health (IDPH, 2020) had reports of over 200 individuals suffering from EVALI, with new cases pending and several deaths. As the popularity of flavored vape pods has been related to the number of teens vaping, Illinois supported efforts to ban flavored pods (Szalinski, 2019). However, is a ban sufficient to

curb use? The American Lung Association is set to promote its public awareness campaign, “Get Your Head Out of the Cloud,” to educate individuals regarding vaping, as well as support a bill in front of the Illinois General Assembly (ILGA): SB1864, the “Smoke Free Illinois Act” (ILGA, 2020; WICS/WRSP staff, 2020). Nurses have one of the best positions to educate individuals regarding smoking in any form, and they must be provided with tools to take actionregarding this public health concern. When e-cigarettes were introduced in 2015, there were no age restrictions for their purchase (Coke, 2020). Therefore, Huey et al. (2020) suggested that it is the nurse’s duty to get involved in lobbying for funding for research and to advocate for legislation that will regulate vaping products.

Facility Efforts

The local hospital where the DNP project will be implemented is part of a hospital system that is dedicated to improving health outcomes for its patients. One doctor, a pediatric intensivist, is currently working on education for pediatric doctors and nurses on obtaining smoking history. The facility has dedicated pulmonary advanced practice registered nurses (APRNs) who work very hard educating patients. Another resource is the chronic obstructive pulmonary disease (COPD) clinical nurse specialist, who works to collect data regarding this patient population as well as educate and support patients with this diagnosis. Each of these individuals has expressed interest in this project and a willingness to consult and collaborate to move the project forward.

Role of the DNP Student

My role in this project was to work with the ADDIE model to develop an education program for the nurses in a Northern Illinois community hospital regarding

EVALI. I served as the facilitator and educator for this project, and subsequently, analyzed the pre- and postsurveys from the project. According to DeCapua (n.d.), DNP Essential VIII describes acting as a mentor for other nurses, which is what I am striving for by creating education on vaping and EVALI for nursing staff at this Northern Illinois hospital. The goal of the project was to ensure that nurses have the knowledge to assess patients for e-cigarette of vaping product use at admission as well as to understand the treatment options and support for patients who suffer from EVALI. Furthermore, this demonstrates that as a DNP-prepared nurse, I am equipped to evaluate information that can improve patient health and community health, thus improving the nation's health as described by DNP Essential VII (DeCapua, n.d.).

As a mother of a teenage son who was introduced to vaping in eighth grade, I am very passionate about this project. As a DNP student, I strive to meet the essentials of the DNP as established by the American Association of Colleges of Nursing (AACN, 2006) to use evidence-based concepts to improve patient outcomes and delivery of health care, examining problems affecting patient health and advocating for patients through interprofessional collaboration with others to develop education and advance nursing practice by mentoring other nurses and guiding patients to improve their health. I hope to educate nurses so that they may go out to their roles to educate patients on the dangers of vaping as well as to provide cessation education and support for those who need to quit. My hope is that in the future, the facility will be able to construct a community project to address vaping in schools. DNP Essential V describes advocacy and health care policy (DeCapua, n.d.). It is my hope that I will be a strong advocate for policy influencing healthcare and patient outcomes moving into the future. I hope to develop education for

the community and partner with schools to address and confront the problem of vaping among adolescents and teens.

Role of the Project Team

The AACN (2006) discusses essentials for doctoral education and notes in essential VI the need for inter-professional collaboration to improve patient and population health outcomes. Working with leaders onsite consisting of nurse managers, advanced practice registered nurses (APRNs), and doctors, the project for education on EVALI was developed. Leadership at the facility was key to developing and supporting evidence-based practice education and outcomes (Hauck et al., 2013). Managers at the facility created a culture of advancing nursing practice and were key to gaining support and participation in this project from the nursing staff. APRNs and doctors supported the project with knowledge and evidence to provide the education for the nurses regarding EVALI.

A doctoral prepared nurse specializing in pulmonary care as an advanced practice registered nurse was collaborating to develop the education piece of the project and supported the implementation of the project with the staff. With support and cooperation of the managers of the Intensive Care Unit (ICU), and the intermediate and pediatric care units as well, these leaders encouraged participation from nursing staff, and implementation of the project occurred with these respective units. A doctor from one of the area's prominent children's hospitals, a pediatrician, who is active in vaping education, volunteered her willingness to collaborate on the project as well and was available to help design the education piece of the project as needed. A statistician was utilized for the evaluation of the project outcomes.

Summary

Section two of the doctoral project provides background information regarding state and local efforts to promote vaping cessation in the community, especially for teens as well as reviewing the relevance to nursing in terms of education on e-cigarette and vaping association lung injury (EVALI). The ADDIE model for education has been reviewed in this section to be utilized for the education that will improve nurses' knowledge and practice relating to EVALI. The role of the DNP student has been discussed in conjunction to the role of the team assisting with the project. Moving forward, section three will discuss the project focus, sources of evidence, and the collection, analysis, and synthesis of project results.

Section 3: Collection and Analysis of Evidence

Introduction

According to Hwang et al. (2020), nurses report a low level of knowledge regarding vaping as well as associated health implications of use. Nursing is a dynamic, ever-changing profession in which nurses are required to continue to educate themselves on new trends and evidence-based practice methods to improve practice and promote the health and well-being of patients, thus improving population health (Bryant & Posey, 2019; Eslamian et al., 2015). Improving patient outcomes requires that nurses educate patients throughout their hospital stay. Therefore, this project was designed to meet the needs of nurses requiring education regarding vaping use as well as health implications of EVALI to promote cessation and provide education for patients. The purpose of this section of the doctoral project is to discuss sources of evidence and research methodology that will be used in addressing the health issue and practice change in nursing. This education program will be implemented at a community hospital in Northern Illinois on the intensive care and intermediate units and the step-down medical-surgical and pediatric units.

Practice-Focused Question

This doctoral project was focused on educating nurses at a Northern Illinois hospital regarding vaping and product use lung injury, also known by the acronym EVALI. The practice-focused question for the project is this: Will educating staff nurses on EVALI increase knowledge? The goal of the project was to increase nurses' knowledge and skills, to develop confidence in providing patient education and cessation information, as well as to learn more regarding EVALI and treatment of this patient

population. Not much is known about the long-term effects of vaping; however, incidences of lung injury have been increasing in users, including teens and young adults. Therefore, the purpose of the project is to increase nursing knowledge with a goal to effect practice change for improving patient and population health by addressing vaping, cessation of product use, and associated health risks.

Sources of Evidence

The education portion of the project was developed using evidence collected from sources obtained through databases such as ProQuest, PubMed, CINAHL, Ovid, and MEDLINE through the Walden University library as well as Google and Google Scholar searches. Information from the CDC was used to create education, in addition to other references from the literature. Terms used for the search included but were not limited to *vaping*, *EVALI*, *lung injury*, *nursing education*, *teens vaping*, and *cessation*. Articles were reviewed for recent data and information on the topic of EVALI to gather the most recent information and statistics to be presented to educate selected nursing staff at a Northern Illinois hospital. As vaping and EVALI have constituted a newer topic in the last decade, the project includes articles from the last 6 years, with only the most recent information used for the education portion of the project.

As the problem of EVALI increased in 2019, articles were searched regarding assessment of this illness to educate nurses. Huey et al. (2019) noted that nurses must continue to conduct work from nursing's perspective to promote evidence-based practice and contribute to literature that focuses on vaping and EVALI. A literature review was conducted to search for education programs for nursing regarding vaping or smoking cessation to further develop the education for the project. Although there is an abundance

of information regarding smoking traditional tobacco products, education on vaping is in its infancy, and there is a need to develop more education for nursing on the topic of vaping and EVALI, as well as to learn to assess patients and to provide patients with cessation resources regarding vaping. VanDevanter et al. (2017) conducted a study that indicated that nursing education on smoking cessation needs improvement and that evidence-based competencies should include screening assessments, interventions, treatment, and cessation.

Alexander and Perez (2019) noted that symptoms of EVALI mimic other respiratory illnesses and there are no diagnostic tests that exist specifically for EVALI, which makes it difficult to diagnosis EVALI to ensure effective treatment. Scheir et al. (2019) noted the difficulty in diagnosing EVALI and noted surveillance case definitions in Table 1 that show that EVALI can mimic other respiratory diseases.

Table 1

Centers for Disease Control and Prevention Surveillance Case Definitions for Severe Pulmonary Disease Associated With E-Cigarette Use

Case classification	Criteria
Confirmed	Using an e-cigarette ("vaping") or dabbing+ during 90 days before symptom onset & Pulmonary infiltrate, such as opacities on plain film chest radiograph or ground-glass opacities on the chest computed tomography & Absence of pulmonary infection on initial workup: Minimum criteria include negative respiratory viral panel (RVP), influenza polymerase chain reaction or rapid test if local epidemiology supports testing. All other clinically indicated respiratory infections disease testing (e.g., urine antigen for *Streptococcus pneumoniae* and *Legionella*, sputum culture if productive cough, bronchoalveolar lavage culture if done, blood culture, human immunodeficiency virus-related opportunistic respiratory infections if appropriate) must be negative
Probable	Using an e-cigarette ("vaping") or dabbing+ in 90 days before symptom onset & Pulmonary infiltrate, such as opacities on plain film chest radiograph or ground-glass opacities on chest computed tomography & Infection identified via culture or polymerase chain reaction, but clinical team caring for patient believes this is not the sole cause of the underlying respiratory disease process **OR** minimum criteria to rule out pulmonary infection not met (testing not performed) and clinical team believes this is not the sole cause of the underlying respiratory disease process & No evidence in medical record of alternative plausible diagnoses (e.g., cardiac, rheumatologic, or neoplastic process).

Note. Adapted from "Severe Pulmonary Disease Associated With Electronic Cigarette Product Use—Interim Guidance," by J. G. Schier et al., 2019, *Morbidity and Mortality Weekly Report*, *68*(36), p. 789 (https://doi.org/10.15585/mmwr.mm6836e2). In the public domain.

According to Jatlaoui et al. (2019), healthcare providers and nurses need to learn more to better assess and evaluate patients, including the following:

- assessing respiratory, gastrointestinal, or constitutional symptoms of the use of e-cigarette or vaping products;
- evaluating suspected EVALI patients using pulse oximetry and chest x-ray if clinically indicated;
- considering treatment as outpatient if stable and meeting criteria for discharge;
- testing for respiratory illness such as flu, if indicated, and administering antibiotic or antiviral medication as indicated;
- using caution with administration of corticosteroids, especially for outpatient treatment, as it may worsen the condition;
- using evidence-based strategies for treatment such as cessation counseling; and
- emphasizing the importance of vaccines to prevent the likelihood of respiratory illness such as the flu.

Selected units were chosen for the project that included intensive care and step-down as well as the intermediate and pediatric units of the hospital due to the prevalence of adolescent and teen vaping. Knowledge of vaping before and after the education program was assessed using a test prior to the program and after the program as a pre/postsurvey evaluation (Appendix B). The survey collected demographic information about the nurses as well as their knowledge about vaping. Once the education was

complete, a standard evaluation tool (Appendix C) was administered to be completed by participants.

Participants

The participant population for the project included 27 registered nurses from the intensive care and intermediate units and the step-down medical surgical and pediatric unit at a Northern Illinois hospital. Participation in the program was voluntary. I met with the nurses to discuss the project objectives and goals and obtain consent for participation. A learning needs assessment recently completed by the facility indicated that the preferred method of learning among nurses was in-person instruction.

Procedures

The intervention was an education program on e-cigarettes and vaping and lung associated injury that targets hospital nurses from multiple units. Nurses on the units had recently completed a learning needs assessment as part of the facility's annual review. The results obtained showed that participants preferred an in-person learning format. Therefore, a PowerPoint presentation was developed to present the educational material to the hospital nurses on the intensive care and intermediate units and the step-down medical surgical and pediatric unit in a 60-minute session.

Protections

Approval for the project was obtained from the Walden University IRB, approval number 08-13-21-0120732. The hospital facility provided permission to conduct the project to educate the nurses.

Participation in the project was voluntary, and nurses were notified via email or in writing regarding the project goals and intent. Interested parties signed a consent to

participate in this DNP staff education project. All surveys, pre and post, as well as the evaluation were submitted anonymously. There were no physical, social, legal, economic, emotional, or psychological risks associated with project participation or the project itself. The project was aimed solely at improving nursing knowledge and skills on the topic of vaping and EVALI.

Analysis and Synthesis

Information collected from the pre- and postevaluations were collected and analyzed using a paired *t* test. Samuel et al. (2019) noted that pre- and posttest evaluations are effective in assessing training and the ability of learners to meet the objectives of education. A paired *t* test refers to the mean difference between samples that are measured twice to evaluate the effectiveness of a training by collecting information from participants using the same questions before and after the training (Statistics Solutions, 2021). The assistance of an expert in statistics was obtained in reviewing the before and after data and the paired *t*-test results to determine if nurses' knowledge regarding EVALI had improved with education.

Summary

In Section 3 of this DNP project, I discussed the implementation of an evidence-based practice education program for registered nurses in a Northern Illinois hospital. The practice-focused question was reviewed, along with the current gap in practice. I discussed the goal of the education, which was to increase nurses' knowledge relating to vaping and EVALI. The evidence used to create and present the education was reviewed, terms specific to vaping were defined, and the methodology for evaluation was discussed. In addition, consent and approval from the facility and Walden's IRB were noted. In

Section 4, I continue by describing the implementation, presenting the analysis and synthesis of the data collected, and discussing recommendations and findings.

Section 4: Findings and Recommendations

Introduction

Vaping has become an increasingly significant health issue since its inception in the early 2000s with marketing focused on younger consumers. Although it was marketed as a tool to aid in cessation of traditional tobacco products, vaping health risks are starting to surface. One such issue is that of EVALI. According to Akpor and Eweiye (2016), it is important for nurses to be educated about vaping and its health-associated risks to screen patients for use and to educate patients regarding health risks and cessation of vaping products. Therefore, the purpose of this project was to provide education to nurses in the intensive care, intermediate, step-down, and pediatric units at a local community hospital. The practice-focused question for the project was whether educating nurses about EVALI would increase nurses' knowledge of the risks and dangers of vaping and product use.

Design

The education curriculum for this project was designed using the framework of the ADDIE model, which stands for analysis, design, development, implementation, and evaluation. Using ADDIE, I identified the gap in practice, confirmed the audience, set goals, and decided upon and discussed the delivery of the education. The desired outcome of the education was to increase nurses' knowledge of vaping and EVALI, and the curriculum was developed using knowledge from pulmonary and pediatric specialists and research. Due to COVID restrictions in place, the curriculum was presented via Microsoft Teams meeting, with time for questions at the end of the presentation. Fifty nurses were informed and consented prior to attending the class, and a quick response

(QR) code and web link were emailed to the nurses, containing the presurvey. Evaluations were conducted prior to the education as well as after with pre- and postsurveys developed from a template used with permission of the authors, as well as a postevaluation of the class. Postsurvey QR codes and links were sent to participants after the class concluded. The project was approved by the facility, which deferred to Walden University's IRB.

Intervention

A PowerPoint presentation was created for the curriculum to be presented to the 50 nursing staff members within an hour timeframe, which consisted of an introduction of the project; a brief history of vaping; an account of the development of the health epidemic posed by vaping; a description of developing risks and dangers, including EVALI; and information for screening and education for patients. Curriculum was created through research and collaboration with medical professionals including pulmonologists and pediatric specialists and implemented with the help of the clinical practice specialists from the participating nursing units. Twenty-seven nurses responded and attended the education.

Measures

The pre- and postsurveys were created using a survey from Mbe et al. (2017) with permission obtained from the author, Dr. Olabode Ayodele, via email (Appendix D). The survey contained basic demographic information, including smoking status of the participant. The questions that followed addressed about the nurse's knowledge of specific vaping products, knowledge of e-cigarettes and vaping, and EVALI using answers of *nothing*, *a little*, *a moderate amount*, and *quite a bit*. Questions were also

posed to determine nurses' attitudes toward vaping such as use as a cessation aid, whether vaping is a public health risk, and whether products should be regulated. Lastly, the nurses were asked if they screened and educated patients. The postsurvey assessed for increased knowledge as well as to determine whether attitudes toward vaping had changed and whether the nurses would better screen and educate patients after they had been provided more education on the risks and dangers of vaping and EVALI.

Procedures

Participation in the project was voluntary and open to nurses who worked in the intensive care, intermediate, step-down, and pediatric units. I explained the project to nurses in person as well as via email notification and explained consent for participation. No risks for participation were identified, and there were no penalties to any nurse declining to participate. I identified myself as a Walden student and current employee of the facility using my facility and school contact information. Nurses had 2 weeks to complete the presurvey; three different time slots were available to attend the education via Teams meeting on 3 separate days. Nurses were encouraged to complete the postsurvey after the education was completed and had 3 days after the final class to return the postsurvey. There were 27 nurses who chose to participate in the class and completed the presurvey; however, only 13 postsurveys were returned. Only 3 class evaluation forms were submitted.

Findings and Implications

Results

The results of the surveys were compared using a *t* test. The plan was for a paired *t* test; however, given the lack of post responses, an unpaired *t* test was used. The project

question addressed whether educating staff nurses on EVALI would increase knowledge. The results shown in Table 2 and Table 3 were positive and confirmed that educating the nurses did improve their knowledge and willingness to educate patients. However, nursing attitudes, although changed by the information presented in class, did not show a statistically significant difference before versus after class, as seen in Table 4. Figure 2 indicates that while an unpaired *t* test did not show a statistically significant difference between pre- and postclass populations, the average response to each question grew in the level of agreement.

With regard to knowledge on vaping, an unpaired *t* test showed a statistically significant difference between precourse and postcourse responses, with postcourse responses indicating increased knowledge on vaping.

Table 2

Knowledge of Vaping

Group	Precourse	Postcourse
Mean	2.296	3.692
SD	0.992852	1.10940
N	27	13
P-value	0.0003	

With regard to knowledge on EVALI, an unpaired *t* test shows a statistically significant difference between precourse and postcourse responses, with postcourse responses reporting increased knowledge on EVALI.

Table 3

Knowledge of E-cigarette and Vaping Associated Lung Injury (EVALI)

Group	Precourse	Postcourse
Mean	1.750	3.462
SD	0.442326	0.518875
N	24	13
P-value	0.0001	

The sample size for precourse EVALI knowledge was 24 rather than 27 due to three participants rating their response as "unsure." These responses were removed from the test.

Table 4

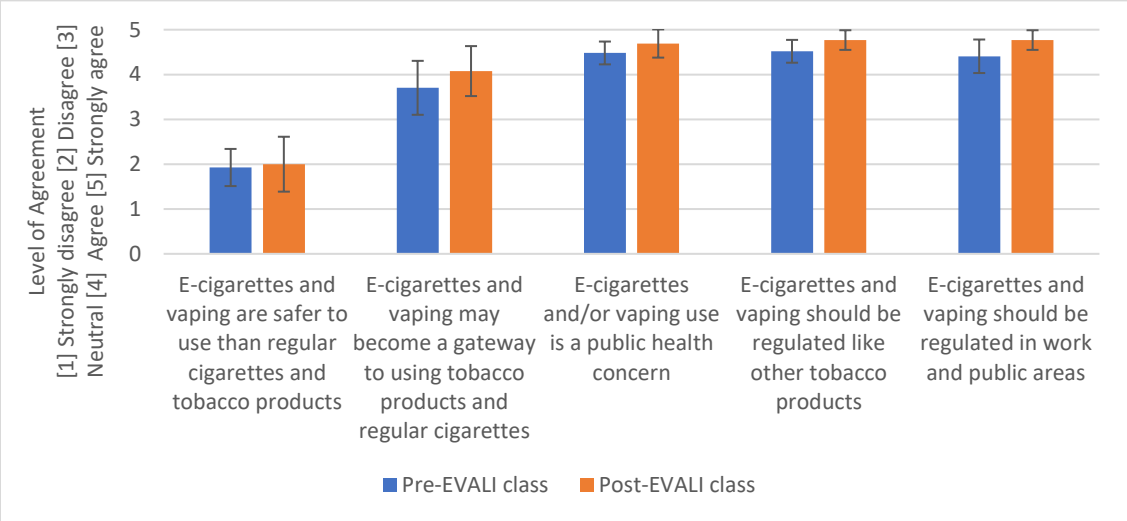
Attitudes and Opinions Regarding E-Cigarettes and Vaping Pre- and Post-E-Cigarette- and Vaping-Associated Lung Injury (EVALI) Class

Survey question	Average response pre-EVALI class (n = 27)	Average response post-EVALI class (n = 13)	*P*-value of unpaired *t* test
E-cigarettes and vaping are safer to use than regular cigarettes and tobacco products	1.93±0.83	2.00±1.22	0.8319
E-cigarettes and vaping may become a gateway to using tobacco products and regular cigarettes	3.70±1.20	4.08±1.12	0.3442
E-cigarettes and/or vaping use is a public health concern	4.48±0.51	4.69±0.63	0.2657
E-cigarettes and vaping should be regulated like other tobacco products	4.52±0.51	4.77±0.44	0.1382
E-cigarettes and vaping should be regulated in work and public areas	4.41±0.75	4.77±0.44	0.1186

Note. Survey data were collected before (n = 27) and after (n = 13) taking the EVALI class. Responses were graded on a scale of 1 (*strongly disagree*) to 5 (*strongly agree*). An unpaired *t* test ($\alpha = 0.05$) did not show a statistically significant difference between pre- and postclass populations.

Figure 2

Attitudes and Opinions Regarding E-Cigarettes and Vaping Pre- and Post-Cigarette- and Vaping-Associated Lung Injury (EVALI) Class



Note. Survey data were collected before (n = 27) and after (n = 13) taking the EVALI class. Responses were graded on a scale of 1 (*strongly disagree*) to 5 (*strongly agree*). On average, postclass responses had a stronger level of agreement than the preclass responses.

Unanticipated Limitations

There were approximately 75 nurses between the units selected for the project implementation, with a little over a third of the nurses participating. The ICU manager had a last-minute impromptu meeting with her staff during one of the class times as well. COVID restrictions also limited the presentation capability to virtual as opposed to in-person learning. COVID had also impacted the emotional and physical well-being of the staff, which may have contributed to willingness to participate in this voluntary project. While the class times were selected as early morning, midday, and early evening, two of these times were close to the shift change, and the midday slot may not have been convenient for night employees trying to sleep or day employees who were working,

which may have put a limit on attendance. Some nurses expressed a preference for in-person learning; however, the majority liked the idea of virtual learning.

Implications of Findings

The findings indicate that the sample population was more knowledgeable on this topic prior to the EVALI class than the normal person due to sampling bias toward those with clinical experience. This bias left little room for stronger disagreement with Question 1 or stronger agreement with Questions 2-4. An improvement for future studies might be to remove sampling bias and select a more random population with less overall clinical experience to determine if the EVALI course is effective.

Despite a sampling bias toward individuals who might already be knowledgeable on this topic, those who took the class self-reported that their knowledge of EVALI had increased, with 46% reporting that their knowledge had increased "a lot" and 54% reporting that their knowledge had increased "a moderate amount." Over 76% of responses stated that the participant would become an advocate for vaping cessation in their community, and 100% of the responses stated that they would comply with facility policies when deciding to counsel patients regarding e-cigarettes and vaping, utilize the screening tool in the Epic system that contains a patient's electronic health record (EHR) to screen patients for vaping, and provide discharge counseling for smoking and/or vaping cessation. Prior to the EVALI class, 51.8% of respondents were unaware that vaping use had been added to admission screening for patients; 48.1% reported that they did not screen their patients for vaping; and 18.5% reported that they were somewhat or very unlikely to counsel patients and/or family members regarding e-cigarettes and vaping, with an additional 18.5% reporting that they were neither likely nor unlikely to

provide such counseling. The increase in awareness and willingness to implement screening and counseling shows a significant change in attitude towards educating patients about vaping.

Potential Implications for Positive Social Change

Providing education to nurses regarding vaping products and use and EVALI is an important step toward addressing the growing epidemic of vaping use among teens and adolescents. According to King et al. (2020), it is important for healthcare professionals to be involved in investigating causes of EVALI and developing diagnostic tools and treatments as well as creating messages for the public regarding health concerns about vaping and product use. As healthcare workers become more aware and educated, they will be able to address vaping and product use to educate patients, thereby creating positive social change in addressing vaping as an epidemic. In this case, the project indicated a positive response from nurses who stated that they learned quite a bit from the education project, which would influence their practice moving forward. In addition to educating nurses regarding vaping products and EVALI, this project encouraged nurses to get involved in groups that advocate for vaping cessation as well as to be advocates of public health in general.

Recommendations

Since the introduction of vaping in the United States in the early 2000s, vaping use has been on the rise, specifically in youth markets (King et al., 2020). This project evidenced the importance of education for nurses on vaping use and EVALI, which improved nursing knowledge and will influence skills when addressing individuals who vape to provide education and cessation materials as well as to treat and care for patients

presenting with EVALI. Due to the newness of vaping and its dangers, education, research, and investigation need to continue as new information presents itself. Prochnow (2017) noted that health care is at the early stages of understanding the risks and adverse effects of e-cigarette and vaping use. Vaping and EVALI are important topics to discuss in moving forward in critical nursing care.

Contributions of the Doctoral Project Team

Members of the research council at the facility were instrumental in assisting with planning and developing the education, as well as the pre- and postsurveys. The clinical nurse specialists and targeted unit managers at the facility were involved in implementing the project and expressed a desire to record the presentation for use in the future to educate nursing staff. The facility is introducing a community outreach committee, and a proposal will be presented to this committee to move forward with education on vaping and product use to present to the community. According to Prochnow (2017), very few nurses today have the knowledge and skills to assess and discuss vaping product use, and as this phenomenon grows, there has not been enough education for healthcare to keep pace. Nurses must have education to increase knowledge and confidence in caring for patients who vape, and they must have educational tools to promote cessation with patients. Furthermore, nurses are in a position to advocate for strict regulations regarding vaping and increase public awareness regarding this health care issue.

Strengths and Limitations of the Project

Strength of the Project

Providing education on the timely topic of e-cigarette and vaping product use, as well as EVALI, is a strength of this project in that it provides education that may increase

the knowledge of nurses as well as provide tools to document and promote cessation with patients. A case study was used in the project with the permission of the patient's legal team (Appendix D) to present the dangers of vaping and evidence of an EVALI case as documented by the *Chicago Tribune* (Thayer, 2019). This case study allowed nurses to see changes to the lungs and understand the diagnosis and treatment of an actual EVALI case.

Limitations of the Project

As the United States was affected by the ongoing COVID-19 pandemic, the education was provided via Microsoft Teams. Although multiple times were provided for the nurses to attend, the sample size was small (n = 27), and the postresponse was approximately 50% (n = 13), thus the need to use an unpaired t test versus the planned paired t test. The survey was developed using an existing survey as a template (Mbe et al., 2017); however, results were self-reported, and this may raise a question of validity (Polit, 2010). During the pandemic, nurses have experienced longer hours, more shifts, and increased workloads leading to burnout, which may have contributed to the lack of engagement in the project. Although ample time was scheduled for the classes, no one had any questions.

Summary

E-cigarette and vaping product use has become more popular since its inception in the United States in 2007 and use among the nation's youth has increased significantly over the years (King et al., 2020). The benefits, if any, as well as the health risks are only now being discussed (Prochnow, 2017). The evidence found by conducting the project to educate nurses regarding vaping and EVALI provides evidence that there is a need for

education for nurses to increase their knowledge to improve care of patients who suffer from vaping product use effects such as EVALI, as well as to enable nurses to provide better education to patients and promote cessation of product use. There is a need not only to provide education for nurses, but also to create nursing advocates in the fight against the vaping epidemic.

Section 5: Dissemination Plan

Dissemination

In preparing for the educational project, nurses were informed of the project, and many expressed an interest in attending; however, the number of nurses in attendance was lower than expected. Despite the low attendance, the results indicated that nurses gained valuable knowledge regarding vaping and EVALI and that practice change would be implemented. The class also encouraged social change through nurses advocating against youth vaping. The clinical nurse specialist who helped to implement the class via Microsoft Teams recorded the class for future use with nursing staff, and the education can be easily updated to include information as new knowledge regarding the dangers of vaping is discovered. The class was easily presented via Teams live.

Moving forward, a proposal can be made to the nurse onboarding and orientation committee to utilize the educational materials with the nurse residency program. In addition, the facility is organizing a newly formed committee for community outreach, and a proposal can be made to address vaping in the community schools and other community programs. Therefore, dissemination can occur through various avenues to educate nurses to provide care to patients as well as to educate the public regarding vaping product use and its dangers, including but not limited to EVALI.

Analysis of Self

As a practicing nurse in clinical care, I push myself every day to provide the very best care for my patients. I do so by continuing to educate myself through continuing education as well as pursuing an advanced degree in nursing. My decision to pursue my doctoral degree was made because I want to educate future generations of nurses, to be a

mentor, and to inspire others to be the best practitioners possible. In my practice, I use evidence-based care and seek to improve the nursing profession through being a member of several nursing councils at my facility, including the research and evidence-based practice council, community outreach, and nursing onboarding and orientation. My long-term goals include becoming a clinical nurse specialist at the facility as well as returning to education in the university setting.

As a scholar, I continuously strive to learn more and encourage others in this profession to do the same. We can never know everything, and we should continue to educate ourselves as well as our peers. Although I do not seek to be in a managerial position, I know that my advanced degree puts me in a position to be a leader in the nursing profession. I will use my knowledge and education to be a leader on the nursing onboarding and orientation committee.

As a project manager, I still feel that I have miles to go; however, I will continue to utilize my knowledge and skills developed throughout my education to be a leader in the field and continue to move forward with this project to promote education and awareness of vaping product use and EVALI, not only with nurses, but with the public as well. I will be an advocate for this project as well as others through engagement with the community outreach committee.

The DNP essentials outlined by the AACN (2006) and further described by DeCapua (n.d.) have become an important part of my doctoral journey. I understand the importance of advocating not only for public health, but also for the nursing profession. I look forward to continuing my career in support of these essentials and creating change moving forward. My inspiration comes from a quote from Walt Disney: “Around here we

don’t look backwards for very long … We keep moving forward, opening new doors and doing new things because we’re curious … and curiosity keeps leading us down new paths.”

Summary

The educational project for nurses on EVALI proved to enhance the nurses’ knowledge. The result of this project indicates that nurses need to receive education regarding vaping product use and EVALI. With increasing use among adolescents and teens, the growing epidemic poses risk to this population not only regarding lung injury, but also in the fact that substances in vape juice, specifically nicotine and THC (tetrahydrocannabinol), pose risks to the developing brains of this population (King et al., 2020). Projects such as this one are necessary tools moving forward to educate nurses and address the dangers of vaping as they become more evident.

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Appendix A: Tools for the Provider

EVALUATING AND CARING FOR PATIENTS WITH SUSPECTED E-CIGARETTE, OR VAPING, PRODUCT USE ASSOCIATED LUNG INJURY (EVALI)

EVALI is considered a diagnosis of exclusion because, at present, no specific test or marker exists for its diagnosis. CDC's updated interim guidance provides a framework for health care providers in their initial assessment, evaluation, management, and follow-up of persons with symptoms of EVALI, but is not intended to substitute clinical judgment. Health care providers should consider multiple etiologies, including the possibility of EVALI and concomitant infection. For more information reference the updated interim guidance published on 10/11/2019, (https://go.usa.gov/xpajC).

CLINICAL EVALUATION

HISTORY

- Ask about respiratory (e.g. cough, chest pain and shortness of breath), gastrointestinal (e.g. abdominal pain, nausea, vomiting and diarrhea), and constitutional symptoms (fever, chills and weight loss) for patients who report a history of using e-cigarette, or vaping, products. Gastrointestinal symptoms preceded respiratory symptoms in some patients.
- Ask patients about recent use of e-cigarette, or vaping, products, including types of substances used (e.g., tetrahydrocannabinol [THC], cannabis [oil, dabs], nicotine, modified products or the addition of substances not intended by the manufacturer).

PHYSICAL EXAM

- Assess vital signs and oxygen saturation via pulse oximetry.
- Pulmonary findings on auscultation exam have often been unremarkable.

LABORATORY TESTING

- Initial laboratory evaluation should be guided by clinical findings.
  - » Consider complete blood count with differential, liver transaminases, and inflammatory markers (e.g., erythrocyte sedimentation rate and C-reactive protein), which may be elevated (Layden JE, 2019).
  - » Consider conducting urine toxicology testing, with informed consent, including testing for THC.
- Infectious disease evaluation to rule out other etiologies might include
  - » Respiratory viral panel including influenza testing during flu season, *Streptococcus pneumoniae*, *Legionella pneumophila*, *Mycoplasma pneumoniae*, endemic mycoses, and opportunistic infections.

IMAGING

- Chest radiograph (CXR).
- Consider chest computed tomography (CT) scan for evaluation of severe or worsening disease, complications, other illnesses, or when CXR results do not correlate with clinical findings.
- Radiographic findings consistent with EVALI include pulmonary infiltrates on CXR and opacities on CT scan (Henry TS, 2019; Schier JG, 2019).

OTHER CONSIDERATIONS

- Further evaluation of patients meeting inpatient admission criteria might include:
  - » Consultation with pulmonary, critical care, medical toxicology, infectious disease, psychology, psychiatry, and addiction medicine specialists.
  - » Additional testing with bronchoalveolar lavage or lung biopsy as clinically indicated, in consultation with pulmonary specialists.

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EVALI DISCHARGE READINESS CHECKLIST

Use this checklist in addition to institutional checklists and resources to assist with planning towards the safe discharge of patients hospitalized with e-cigarette, or vaping, product use–associated lung injury

CONFIRM PATIENT CLINICAL STABILITY

Stable oxygenation and exercise tolerance for 24–48 hours prior to planned discharge* Stable vital signs, physical exam, resolution of symptoms, and normalized laboratory tests

ENSURE INITIAL FOLLOW-UP, OPTIMALLY WITHIN 48 HOURS

Confirm outpatient follow up with primary care and/or pulmonology optimally within 48 hours of anticipated discharge

ENSURE APPROPRIATE OUTPATIENT FOLLOW UP

Confirm outpatient follow up, as indicated by clinical course during hospitalization

Primary care: for all EVALI patients, optimally within 48 hours

Pulmonology: for all EVALI patients, follow up within 2–4 weeks, and at 1–2 months

Endocrinology: for pediatric EVALI patients given steroids, for all EVALI patients at heightened risk of adrenal suppression due to duration or intensity of steroid treatment

Cardiology: for those EVALI patients with history of cardiac pathology

Psychiatry: for those EVALI patients with concurrent anxiety, depression, PTSD, ADHD, previously diagnosed psychiatric illness, or if inpatient psychiatry consultation was required

Addiction medicine: for those EVALI patients with a positive substance use disorder screen

Physical therapy: for those EVALI patients demonstrating any deconditioning

Pain management: for those EVALI patients with a chronic pain syndrome or pain due to comorbidities

Provide written guidance about signs/symptoms and instructions on finding help if symptoms recur

Consider additional measures to optimize outpatient follow up for patients with conditions of high risk for EVALI rehospitalization and death**

OPTIMIZE OUTPATIENT MEDICATION USE & SAFETY

Complete discharge medication reconciliation with outpatient medications, clinical course

Complete discharge medication counseling between inpatient pharmacist and patient

Counsel on signs of adrenal insufficiency if patient was prescribed corticosteroids during hospitalization, and on informing providers about corticosteroid treatment in case of acute injury or illness

CONNECT TO SOCIAL CARE WORKFORCE

Complete evaluation by social care workforce to identify, record, and address post discharge support needs

Complete screening for mental health and substance use disorders

Connect to community services to address social determinants of health

OFFER AND OPTIMIZE CESSATION SUPPORT

Complete substance use disorder screening (ASSIST, CRAFFT-N, or institution's preferred tool) with connection to addiction medicine, follow up counseling, and medications when indicated

Discuss cessation from e-cigarette, or vaping, including documenting a quit plan, and offering evidence-based tobacco product cessation interventions, including behavioral counseling and medications

* After EVALI admission or if prior home O2 dependence, confirmed stability on low flow O2 with home discharge on supplemental O2 may be indicated.

** Older age, cardiac disease, diabetes, chronic pulmonary disease (including chronic obstructive pulmonary disease and obstructive sleep apnea), or multiple comorbidities.

Among patients aged < 18 years, health care professionals can consider the use of interventions that have been shown to increase cigarette smoking cessation among adults, including behavioral interventions. No medications are currently FDA-approved for tobacco product cessation, including e-cigarettes, in children and adolescents. CS 314064-A December 20, 2019

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Appendix B: Nursing Knowledge Evaluation Tool

E-cigarette Knowledge, Beliefs and Attitude Questionnaire

Pre- and Post-Education Evaluation

Post-survey for E-cigarette and Vaping Associated Lung Injury class

1. What is your gender?

- ◯ Woman
- ◯ Man
- ◯ Non-binary
- ◯ Prefer not to say

2.Which of the following describes your smoking status?

- ◯ smoker
- ◯ nonsmoker
- ◯ ex-smoker

3.Have you ever tried e-cigarettes or vaping?

- ◯ Yes
- ◯ No

4.How long have you been a nurse?

- ◯ Less than 5 years
- ◯ 5-10 years
- ◯ 11-15 years
- ◯ 15-20 years
- ◯ more than 20 years

5.Which brands of e-cigarettes or vaping have you heard of? Check all that apply

- ☐ Smoke everywhere
- ☐ Runyan
- ☐ NJOY
- ☐ Blu
- ☐ JUUL

6.How did you first hear about e-cigarettes or vaping? Check all that apply

- ☐ Media ads
- ☐ newspaper
- ☐ billboards or signs
- ☐ patients
- ☐ professional sources

7.Have you ever heard of e-cigarette and vaping associated lung injury (EVALI)?

- ◯ Yes
- ◯ No
- ◯ Not sure

8.How much do you know about EVALI?

- ◯ Nothing at all
- ◯ A little bit
- ◯ A moderate amount
- ◯ Quite a lot
- ◯ Unsure

9.How much do you know about e-cigarettes and vaping?

- ◯ Nothing at all
- ◯ A little bit
- ◯ A moderate amount
- ◯ Quite a lot

10. E-cigarettes and vaping are safer to use than regular cigarettes and tobacco products

- ◯ Strongly agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly disagree

11. E-cigarettes and vaping are helpful aids for smoking cessation

- ◯ Strongly agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly Disagree

12. E-cigarettes and vaping may become a gateway to using tobacco products and regular cigarettes

- ◯ Strongly agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly Disagree

13. E-cigarettes and/or vaping use is a public health concern

- ◯ Strongly agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly disagree

14. E-cigarettes should be regulated like other tobacco products

- ◯ Strongly agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly disagree

15. E-cigarettes and vaping should be regulated in work and public places

- ◯ Strongly agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly disagree

16.Who is most likely to influence your decision to counsel patients about e-cigarettes and vaping?

- ◯ Supervisors/61grs.
- ◯ Co-workers
- ◯ Family members
- ◯ Friends
- ◯ other

17.To what extent are the policies of the facility important to your decision to counsel patients and family members regarding e-cigarettes and vaping?

- ◯ Not at all
- ◯ Slightly important
- ◯ Moderately important
- ◯ Very important
- ◯ Extremely important

18.Are you aware that vaping use has been added to admission screening for patients?

- ◯ Yes
- ◯ No

19.Do you screen your patients for vaping?

- ◯ Yes
- ◯ No

20.How likely are you to counsel your patients and/or family members about e-cigarettes and vaping?

- ◯ Very likely
- ◯ Somewhat likely
- ◯ Neither likely nor unlikely
- ◯ Unlikely
- ◯ Extremely Unlikely

Post-survey for E-cigarette and Vaping Associated Lung Injury class

1.What is your gender?

- ◯ Woman
- ◯ Man
- ◯ Non-binary
- ◯ Prefer not to say

2.Which describes your smoking status?

- ◯ Smoker
- ◯ Non-smoker
- ◯ Ex-smoker

3.If you answered yes to question 2, has this class influenced you to quit?

- ◯ Yes
- ◯ No
- ◯ Maybe

4.Based on information discussed in this class, has your knowledge regarding vaping increased?

- ◯ Not at all
- ◯ A little
- ◯ A moderate amount
- ◯ A lot
- ◯ Quite a bit

5.Based on information discussed in this class, has your knowledge regarding EVALI increased?

- ◯ Not at all
- ◯ A little
- ◯ A moderate amount
- ◯ A lot

6.Based on the class, what is your belief about the following statements:

E-cigarettes and vaping are helpful aids for smoking cessation

- ◯ Strongly agree
- ◯ Agree
- ◯ Disagree
- ◯ Strongly disagree
- ◯ Neutral

7. E-cigarettes and vaping are safer to use than regular cigarettes and tobacco products

- ◯ Strongly agree
- ◯ Agree
- ◯ Disagree
- ◯ Strongly disagree
- ◯ Neutral

8. E-cigarettes and vaping may become a gateway to using tobacco products and regular cigarettes

- ◯ Strongly agree
- ◯ Agree
- ◯ Disagree
- ◯ Strongly disagree
- ◯ Neutral

9. E-cigarettes and/or vaping use is a public health concern

- ◯ Strongly agree
- ◯ Agree
- ◯ Disagree
- ◯ Strongly disagree
- ◯ Neutral

10. E-cigarettes and vaping should be regulated like other tobacco products

- ◯ Strongly agree
- ◯ Agree
- ◯ Disagree
- ◯ Strongly disagree
- ◯ Neutral

11. E-cigarettes and vaping should be regulated in work and public areas

- ◯ Strongly agree
- ◯ agree
- ◯ neutral
- ◯ disagree
- ◯ Strongly disagree

12. **Has this class influenced you in the following ways:** Your decision to counsel patients about e-cigarettes and vaping

- ◯ Yes
- ◯ No
- ◯ Maybe

13.To comply with facilities policies when deciding to counsel patients and family members regarding e-cigarettes and vaping

- ◯ Yes
- ◯ No
- ◯ Maybe

14.Will you utilized the screening tool in EPIC to screen your patients for vaping?

- ◯ Yes
- ◯ No
- ◯ Maybe

15.Will you provide discharge counseling for smoking and or vaping cessation?

- ◯ Yes
- ◯ No
- ◯ Maybe

16.Will you become an advocate for vaping cessation in your community?

- ◯ Yes
- ◯ No
- ◯ Maybe

Appendix C: E-Cigarette and Vaping Education Evaluation

For each of the questions below, circle the response that best indicates how you feel about the statement, where 1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree, 5=Strongly Agree

Date:_____

1.The objectives of the training were clearly defined.

- ○ Strongly agree
- ○ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly disagree

2.The topic was relevant to my work.

- ○ Strongly agree
- ○ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly disagree

3.The content was organized and easy to follow.

- ○ Strongly agree
- ○ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly disagree

4.The training will be useful in my work.

- ○ Strongly agree
- ○ Agree
- ○ Disagree
- ○ Strongly disagree
- ○ Neutral

5.The trainer was well-prepared.

- ○ Strongly agree
- ○ Agree
- ○ Disagree
- ○ Strongly disagree
- ○ Neutral

6.The trainer was knowledgeable about the topic.

- ○ Strongly agree
- ○ Agree
- ○ Disagree
- ○ Strongly disagree
- ○ Neutral

7.The training objectives were met.

- ○ Strongly agree
- ○ Agree
- ○ Disagree
- ○ Strongly disagree
- ○ Neutral

8.Overall, how do you rate the training.

- ○ Excellent
- ○ Very good
- ○ Good
- ○ Fair
- ○ Poor

Appendix D: Letters of Permission

Olabode Ayodele <71labode.ayodele@indstate.edu>
Mon 9/13/2021 2:14 PM

To: Imaoka, Dana

CAUTION: External email, please be mindful before clicking links, opening attachments, or replying.

Hello!
I hereby grant permission for the use of survey in our paper titled, "Nurses' knowledge, beliefs, attitudes, and practices regarding electronic cigarettes: A cross-sectional study". Please, cite the paper accordingly in your work.
Thank you and best wishes.

'Bode
Olabode Ayodele, MPH, PhD, CHES
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Jennifer McGuffin <JMcGuffin@rblaw.net>
Wed 9/22/2021 3:58 PM
To:Dana Imaoka
Cc:Polly Hergenreder <4boyss@comcast.net>

Good afternoon, Dana-

Polly Hergenreder shared your email with me, as I am the Chief Communications Officer of the law firm that represents Adam. You are free to use any of the content or photos from the Chicago Tribune or any other media outlet where he was featured.

Thank you for your interest in his experience and in helping keep others safe.

Best,

Jennifer McGuffin
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