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Review Article

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A Quality Improvement Project to Increase the Rate of HPV Vaccination Initiation in Adolescents

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Abstract

The vaccination rate of the human papilloma virus vaccine [9vHPV] is low, with only 63% of eligible females and 50% eligible males receiving the vaccine in 2016. The aim of this quality improvement project was to increase the initiation rate of HPV vaccination at Smyrna Pediatrics by 20%, from 3.6% to 4.3% over four weeks. Two physicians, one nurse practitioner, and two medical assistants implemented this quality improvement initiative. There is a lack of education and standardized communication about HPV and 9vHPV to prevent against the virus. A standardized script was created so that all conversations between healthcare professionals and patients and their parents or guardians included the wording of the 9vHPV being recommended rather than optional. Educational material from the CDC was the standard handout given to each adolescent and their parent or guardian. Standardized education and communication was to be provided at each adolescent visit of the 125 eligible adolescents seen during the four-week implementation period, 4% (n = 5) agreed to receive the 9vHPV vaccine. With a baseline of 3.6% (n = 4), there was an 11.1% increase of initiation of 9vHPV. The use of standardized education documents presented to all patients and their parents or guardians established health education as the mainstay of the project and provided information about the importance of prevention and protection from the virus that the vaccine prevents. The implementation of results over a longer period of time may prove to be more effective for the practice's increase of vaccination rates overall.

The human papillomavirus (HPV) is a virus that is spread via skin-to-skin contact and can be prevented with the administration of the HPV vaccination. While the HPV virus can present in over 150 strands, the nine most common strands associated with medical complications are covered in the nine-valent HPV vaccine, which will be referred to as 9vHPV for the remainder of this paper. Among these nine strands of the human papillomavirus, four are most commonly found in humans. Strands six and 11 are most commonly associated with genital warts, most frequently found in males [1]. HPV strands 16 and 18 are known as oncogenic or cancer-causing strands. These are the most common strands associated with cervical, vulvar, vaginal, penile, anal, and or pharyngeal cancers [2]. The oncogenic strands are more commonly found in females exposed to the virus. Nearly 79 million Americans are infected with HPV [3]. According to Boston University School of Public Health, 70% of all cervical cancers and 90% of genital warts in the United States can be attributed to HPV [4]. It is estimated that 100% of the US population will be infected with some type of HPV in their lifetime [5]. This paper will describe a quality improvement (QI) initiative to improve the initiation rate of the HPV vaccination at a small, rural pediatric primary care clinic in Smyrna, TN.

Problem Statement

Many practices that provide health care to adolescents struggle to improve their 9vHPV vaccination rate. For example, as of August 2016, only 63% of eligible female adolescents and 50% of eligible males had initiated the HPV vaccination nationwide [6]. According to a study by Johnson, Lin, Cabral, Kazis, and Katz, the most common reasons for refusal of the HPV vaccination were that it was not recommended (21.3%), the vaccine was unnecessary (16.8%), lack of knowledge about the vaccine (9.7%), or that the teen was not yet engaging in sexual activity (8.7%) for any of the previously mentioned reasons, parents and adolescents often refuse the vaccinations [7]. The lack of knowledge or education is truly the foundation of the problem, as this can encompass the categories of the vaccine either not being recommended or necessary. Research also shows that effective recommendation and education from providers are both crucial to a parent's and/or patient's decision to receive the HPV vaccination [8].

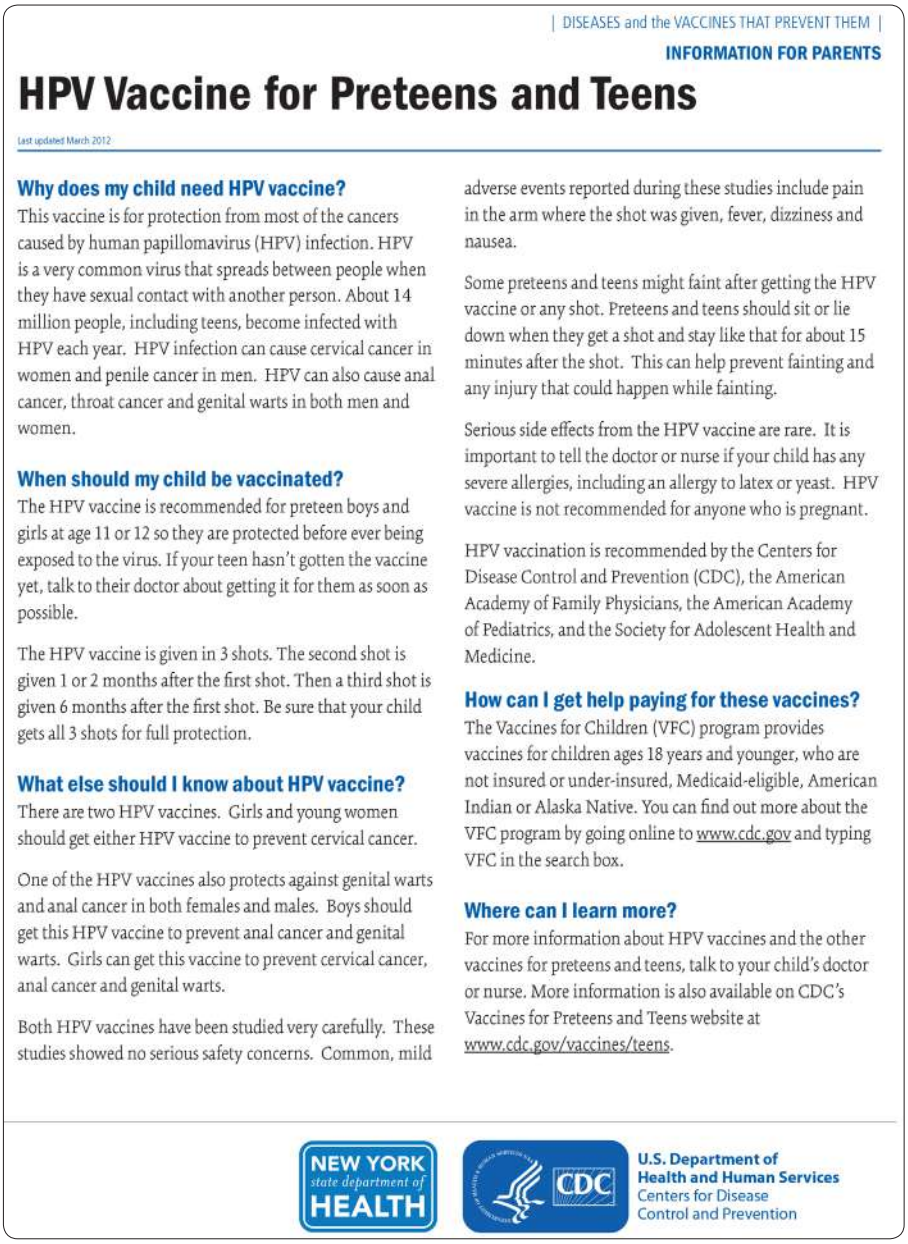
According to Malo, Ali, Sutton, Perkins, Guiliano, and Vadaparampil, there are missed opportunities for educating about the importance of adolescent vaccinations and for providing context of communication between healthcare providers and patients in regards to these vaccinations [9]. In regards to content of communication, "the President's Cancer Panel recommends that physicians frame HPV vaccine as a cancer-preventing vaccine, emphasize vaccine safety and efficacy, and underscore the importance of vaccinating at age 11 or 12 years" [9]. In the pediatric clinic where the improvement initiatives took place, vaccination rates are overall a bit of a struggle. Clinic leadership defined initiation of the HPV vaccine as an area that could be improved within the practice. The context of communication

between healthcare professionals, including physicians, nurse practitioners, medical assistants, nurses, and patients is vital when discussing vaccinations that are recommended but not necessarily required for adolescents.

Purpose/Aims/Objectives

The aim of this quality improvement project was to increase the initiation rate of HPV vaccination at Smyrna Pediatrics by 20%, from 3.6% to 4.3% by September 29, 2017. The improvement goal of a 20% increase in vaccination rate was considered by clinic leadership to be realistic, even prior to knowledge of baseline data. Patients ages nine to 15 are eligible to receive the two-dose series. It was hoped that the two-dose series would be more widely accepted than the three-dose series to these pediatric patients and their parents. Adolescents from age 15 through 18 must receive three doses of the 9vHPV vaccine. The first objective of the project was to present educational material about the HPV vaccine from reputable sources such as the Food and Drug Administration (FDA), Centers for Disease Control and Prevention (CDC), Advisory Committee on Immunization Practices (ACIP), and American Academy of Pediatrics (AAP) to patients and their parents or guardians. The second objective was to implement a standardized educational process that ensured all eligible patients were educated about the HPV vaccine. The educational material is included in the appendix and was used to inform patients about HPV, including reasons for vaccination, side effects, and vaccine safety (see Appendix A1, A2). The measurement of the second objective was to determine whether consistent, standardized education improved the rate of HPV vaccine initiation at the clinic. The third objective for this project was to change the communication between the provider and patient so that the 9vHPV vaccine was discussed as being *recommended* rather than *optional* (See Appendix B). The predicted outcome was to ultimately increase rates of HPV initial vaccination and, hopefully, completion of the HPV vaccination series.

Appendix A1: HPV Vaccine for Preteens and Teens Fact Sheet (English)



| DISEASES and the VACCINES THAT PREVENT THEM |

INFORMATION FOR PARENTS

HPV Vaccine for Preteens and Teens

Last updated March 2012

Why does my child need HPV vaccine?

This vaccine is for protection from most of the cancers caused by human papillomavirus (HPV) infection. HPV is a very common virus that spreads between people when they have sexual contact with another person. About 14 million people, including teens, become infected with HPV each year. HPV infection can cause cervical cancer in women and penile cancer in men. HPV can also cause anal cancer, throat cancer and genital warts in both men and women.

When should my child be vaccinated?

The HPV vaccine is recommended for preteen boys and girls at age 11 or 12 so they are protected before ever being exposed to the virus. If your teen hasn't gotten the vaccine yet, talk to their doctor about getting it for them as soon as possible.

The HPV vaccine is given in 3 shots. The second shot is given 1 or 2 months after the first shot. Then a third shot is given 6 months after the first shot. Be sure that your child gets all 3 shots for full protection.

What else should I know about HPV vaccine?

There are two HPV vaccines. Girls and young women should get either HPV vaccine to prevent cervical cancer.

One of the HPV vaccines also protects against genital warts and anal cancer in both females and males. Boys should get this HPV vaccine to prevent anal cancer and genital warts. Girls can get this vaccine to prevent cervical cancer, anal cancer and genital warts.

Both HPV vaccines have been studied very carefully. These studies showed no serious safety concerns. Common, mild adverse events reported during these studies include pain in the arm where the shot was given, fever, dizziness and nausea.

Some preteens and teens might faint after getting the HPV vaccine or any shot. Preteens and teens should sit or lie down when they get a shot and stay like that for about 15 minutes after the shot. This can help prevent fainting and any injury that could happen while fainting.

Serious side effects from the HPV vaccine are rare. It is important to tell the doctor or nurse if your child has any severe allergies, including an allergy to latex or yeast. HPV vaccine is not recommended for anyone who is pregnant.

HPV vaccination is recommended by the Centers for Disease Control and Prevention (CDC), the American Academy of Family Physicians, the American Academy of Pediatrics, and the Society for Adolescent Health and Medicine.

How can I get help paying for these vaccines?

The Vaccines for Children (VFC) program provides vaccines for children ages 18 years and younger, who are not insured or under-insured, Medicaid-eligible, American Indian or Alaska Native. You can find out more about the VFC program by going online to www.cdc.gov and typing VFC in the search box.

Where can I learn more?

For more information about HPV vaccines and the other vaccines for preteens and teens, talk to your child's doctor or nurse. More information is also available on CDC's Vaccines for Preteens and Teens website at www.cdc.gov/vaccines/teens.

NEW YORK state department of HEALTH

CDC

U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

Las vacunas para preadolescentes: Qué es lo que deben saber los padres

¿Por qué necesita mi hijo vacunas ahora?

Las vacunas no son solo para los bebés. Algunas de las vacunas que los bebés reciben pueden empezar a perder su eficacia a medida que los niños crecen. Y a medida que los niños crecen, pueden entrar en contacto con distintas enfermedades. Hay vacunas que pueden ayudar a proteger a su preadolescente o adolescente de estas otras enfermedades.

¿Qué vacunas necesita mi hijo?

La vacuna Tdap

Esta vacuna ayuda a proteger contra tres enfermedades graves: el tétanos, la difteria y la tosferina (pertussis, también llamada tos convulsa). Los preadolescentes deben recibir la Tdap a los 11 o 12 años. Si su hijo adolescente no recibió la vacuna Tdap cuando era preadolescente, hable con su médico o enfermero para ponerle la vacuna ahora.

La vacuna antimeningocócica

La vacuna antimeningocócica conjugada protege contra algunas de las bacterias que pueden causar meningitis (inflamación del revestimiento que cubre el cerebro y la médula espinal) y septicemia (infección de la sangre). Los preadolescentes necesitan recibir la primera vacuna antimeningocócica a los 11 o 12 años de edad. Necesitan una segunda vacuna antimeningocócica a los 16.

La vacuna contra el VPH

Las vacunas contra el virus del papiloma humano (VPH) ayudan a proteger a las niñas y a los niños de la infección por el VPH y el cáncer causado por este virus. Todos los preadolescentes de 11 y 12 años deben recibir dos vacunas contra el VPH con 6-12 meses de separación. Los preadolescentes y adolescentes que no hayan comenzado o terminado la serie de vacunas contra el VPH deben hablar con el médico o el personal de enfermería para ponérselas ahora.

La vacuna contra la influenza (gripe)

La vacuna anual contra la influenza es la mejor manera de reducir las probabilidades de contraer la influenza estacional y de transmitírsela a los demás. Incluso los preadolescentes y adolescentes sanos pueden enfermarse gravemente por la influenza y contagiársela a los demás. Aunque todos los preadolescentes y adolescentes deben recibir la vacuna contra la influenza, es especialmente importante que se vacunen los que tienen afecciones crónicas como asma, diabetes y enfermedades cardiacas. El mejor momento para ponerse la vacuna contra la influenza es poco después de que esté disponible en su comunidad, idealmente antes de octubre. Aun cuando lo mejor es vacunarse antes de que la influenza comience a causar enfermedades en su comunidad, la vacunación puede ser beneficiosa mientras los virus estén circulando, incluso en enero o más tarde.

¿Cuándo debe ser vacunado mi hijo?

Un buen momento para recibir estas vacunas es durante el chequeo médico anual. Su preadolescente o adolescente también puede recibir estas vacunas durante el examen físico que se exige para poder practicar deportes, para la escuela o los campamentos. Es una buena idea preguntarle al médico o al enfermero cada año si hay alguna vacuna que su hijo podría necesitar.

¿Qué más debo saber acerca de estas vacunas?

Estas vacunas han sido estudiadas muy cuidadosamente y son seguras. Pueden causar algunos efectos secundarios leves como dolor o enrojecimiento en la parte del brazo donde se ponga la inyección. Algunos preadolescentes y adolescentes pueden desmayarse después de recibir una vacuna. Sentarse o recostarse al ponerse una vacuna, y mantenerse en esa posición por unos 15 minutos después de recibir la inyección puede ayudar a evitar un desmayo. Los efectos secundarios graves son poco comunes. Es muy importante que le diga al médico o al personal de enfermería si su hijo tiene alergias graves —incluidas alergias a la levadura, al látex o a los huevos de gallina— antes de que le pongan alguna vacuna.

¿Cómo puedo obtener ayuda para pagar por estas vacunas?

El programa de Vacunas para Niños (VFC, por sus siglas en inglés) proporciona vacunas para niños de hasta 18 años que no tengan seguro médico, que cumplan con los requisitos para recibir Medicaid o que sean indoamericanos o nativos de Alaska. Puede averiguar más sobre el programa VFC en Internet en www.cdc.gov/spanish/especialesCDC/ProgramaVacunas.

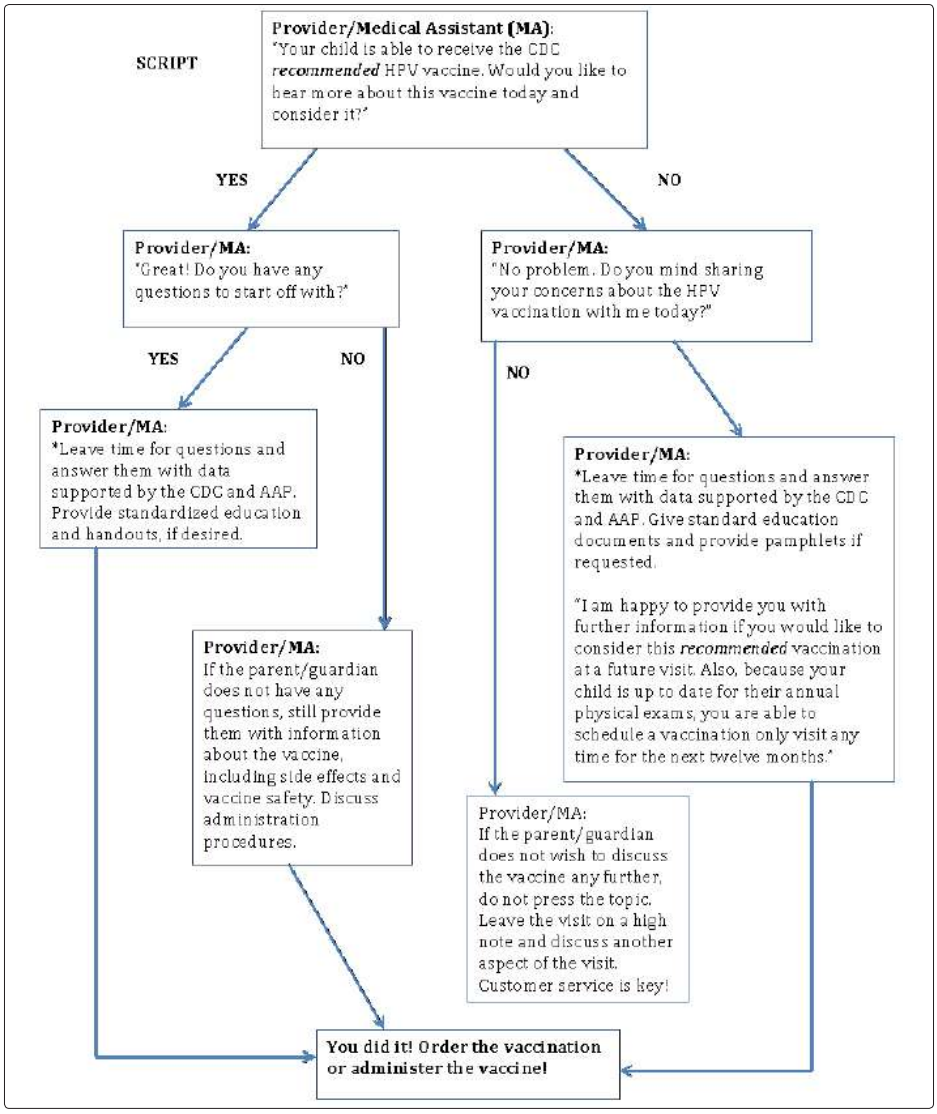
¿Dónde puedo obtener más información?

Hable con el médico o el enfermero de su hijo acerca de las vacunas que podría necesitar. También puede encontrar más información sobre ellas en el sitio web de los CDC "Vacunas para preadolescentes y adolescentes" en www.cdc.gov/spanish/especialesCDC/VacunasPreadolescentes/.

DISTRIBUIDO POR:

U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

Appendix B: Script for Standardized Communication between Providers, MAs and Patients and their Guardians



Background

Along with the Hepatitis B vaccine (HBV), the HPV vaccination is considered a cancer preventive vaccine. According to the National Cancer Institute, Widespread vaccination with…Gardasil [4V] has the potential to reduce cervical cancer incidence around the world by as much as two-thirds, while Gardasil9 [9vHPV] could prevent an even higher proportion. In addition, the vaccine can reduce the need for medical care, biopsies, and invasive procedures associated with follow-up from abnormal cervical screening, thus helping to reduce health care costs and anxieties related to follow-up procedures.

The 9vHPV vaccination was introduced in 2014; it was developed to prevent outbreak of the nine most common strands of HPV associated with negative implications of the disease [10]. These strands include 6, 11, 16, 18, 31, 33, 45, 52, and 58. Additionally, higher vaccination rates can increase herd immunity, a phenomenon in which the prevalence of the strands covered with the HPV vaccination will be reduced in the overall population [2].

The 9vHPV vaccination is most effective when administered from ages nine to 26 in both males and females, but it can be administered beyond this age range. According to recommendations by the CDC, it is now recommended that adolescents under the age of 15 receive only two doses of the HPV vaccination at least six months apart. The previous requirements for a three-dose-series are still in place for that age 15 and older [6]. For the three-dose series, the first two vaccinations must be given at least two months apart; the third dose is given at least six months after administration of the first dose.

While the prevention of cancers and genital warts is the ultimate goal of this vaccination, it is also helpful in decreasing the spread of HPV in general. Decreasing the negative side effects of the virus is most important, but the vaccine must be initiated in order to have a decrease in negative side effects. Before the vaccine series is initiated, adolescents and their parents or guardians must be properly educated about the vaccination. Multiple negative opinions exist about the vaccination, and these are often formulated from unreliable sources. In the realm of education, it is vital to provide accurate, evidence-based information about the HPV vaccination using terminology that adolescents and their parents can understand. Information from sources such as the CDC, WHO, and the National Institute of Health (NIH) are reliable and fit the realms of being both accurate and evidence-based.

Most often, the clinical staff initiates discussion of the HPV vaccination at the time of seventh grade vaccine administration, which takes place at the 11-12 year old well child visit. Typical vaccinations administered at this visit include the measles, mumps, and rubella (MMR) booster and the meningococcal (MCV4) vaccine, which are both required by Tennessee school policy. Providing information about the HPV vaccination in the midst of receiving other vaccinations is a perfect opportunity for patient and parental education on the benefits of the HPV vaccination. Although the vaccine is recommended to be administered at the visit prior to entry into seventh grade, it can be administered as early as age nine.

It is important to be mindful of communication skills when presenting information on a vaccine that is not required. Instead of using terminology such as *optional* vaccination addressing it as *recommended* by the CDC is a better way to convey the importance of this vaccine. When patients and their parents hear the word recommended instead of optional, they may be more inclined to choose to receive the vaccine. Before the initiation of the quality improvement project, there was no consistent messaging or standardization of education related to the HPV vaccine at the clinic. The staff and administration at the clinic where the project took place recognized the low rate of HPV vaccination and supported an initiative that could improve the rate of initiation of the 9vHPV vaccine.

Significance to Healthcare, Nursing, and Advanced Practice

Nurses and medical assistants (MAs) are often given the task of administering vaccines. While the provider may elaborate on the education of the vaccine using consistent education and terminology, nurses and MAs often discuss the side effects that may be associated with vaccinations in general. They should be able to provide quality, evidence-based information that addresses questions and concerns from the patient and their parent or guardian. This will guarantee consistent messaging and communication throughout the clinic. Additionally, nurses and MAs may be responsible for obtaining final consent prior to administering immunizations. The nurse's or MA's role overall is to promote health and support the processes that encourage vaccination. They must be knowledgeable about vaccines as well as support a standardized process of patient education about vaccines if one exists.

It is the duty of healthcare providers, such as advanced practice nurses (APRNs) and physicians, to ensure that patients are educated on the importance of vaccinations. Additionally, providers should emphasize timely vaccination. APRNs can promote health not only by encouraging patients to be immunized, but also by leading initiatives to improve the rate of immunization. Risks and benefits associated with individual vaccines must be explored with patients. If a patient or parent declines immunization, the provider should talk further with the patient, parent, or guardian in order to understand why they are refusing the vaccination. If the reason includes a lack of understanding about the vaccine, then education, including the risks of refusing the vaccination, should be reinforced. Moreover, it is the advanced practice nurse's role to engage patients and their parents or guardians in preventive health care practices in regards to vaccinations and to offer in depth, evidence-based information that allows both patient and parent or guardian to make an informed decision about whether or not to receive specific vaccines.

Vaccinations are important aspects of health care. With the ultimate goal of disease prevention, education about vaccinations is important to health promotion. While it is common practice to vaccinate children for illnesses such as measles, mumps, varicella, and polio, education should be equivalent for recommended vaccinations that cover other common illnesses as well. As stated in the background of this paper, the HPV infection is preventable with the 9vHPV vaccine. Higher vaccination rates will promote health, may decrease the spread of HPV, and decrease long term effects of HPV exposure including cervical cancer and genital warts in the adolescent and adult population.

System or Population Impact

The population impacted by this improvement project was adolescents seen at the primary care pediatric clinic, aged nine through 18, who were eligible to receive the two-or three-dose HPV vaccine. Although the adolescent was the center of the intervention, their parents or guardians were also important to consider because they often play a role in the child's health care and may need to give consent for the vaccination, depending on clinic policies that are in place. Smyrna Pediatrics requires verbal consent for vaccinations and will benefit from this intervention by increasing vaccination rates and contributing to herd immunity. According to the National Institution of Allergy and Infection Disease (NAID), herd immunity is when a community is protected against a contagious disease due to a critical portion of the community being immunized against the contagious disease [11]. Additionally, financial benefits are possible due to future reimbursement practices related to outcomes including vaccination rates. This intervention assisted in increasing the rate of initiation of the HPV vaccine by implementing a standardized, evidence-based educational program and messaging by all staff so that accurate knowledge was provided by all healthcare professionals to patients and their guardians.

Synthesis of Evidence

Literature Search

The four database advanced searches engines used in the literature search included EBSCOhost, Clinical Key for Nursing, PubMed, and Science Direct. Mesh terms used in the search were "HPV vaccine education AND adolescent AND rate". The hierarchy of evidence used to determine the levels of evidence within the literature was developed by Melnyk and Fineout-Overholt [12]. In addition to the database literature searches, information from the American Academy of Pediatrics was reviewed and incorporated into the literature review. EBSCOhost yielded 456 articles, PubMed yielded 88 results, and Science Direct yielded 1,452 results. Clinical Key for Nursing "HPV vaccine education" search yielded 879 results. These were narrowed by including for age (9-18 years), articles published within the past five years, primary care practice, human subjects, evidence-based articles in full text, intervention, and location (United States). The literature search limited participants in studies to be within the age range seen at Smyrna Pediatrics, excluding participants over the age of 18, unless they were parents of adolescents. Other exclusions included adult clinics, publication older than five years, and school-based clinics. Fourteen articles were selected from this literature search. A majority of the articles included national data from surveys, which are considered level VI of evidence. There were incorporations of randomized control trials which are level II of evidence and considered valid and reliable overall. One article utilized a control trial that was not randomized, which ranks the evidence lower on the hierarchy of evidence [13]. Nevertheless, the data were sufficient to include for this DNP quality

improvement project. Findings in the literature were vital to the implementation of the intervention to increase HPV vaccination rates.

After implementation of the project, it was noted that barriers should have been identified throughout the duration of the quality improvement initiative. An additional literature search was performed utilizing Google Scholar and the MeSH terms "barriers to HPV vaccine in adolescents". Exclusions included articles published more than five years before the search. Articles that addressed pediatric and adult populations were both included as to have the most substantial amount of data present. Three articles were selected that discussed effective patient and provider education, addressed concerns of patients and their parents or guardians, and utilized innovative education and communication about the 9vHPV vaccine [14-16].

Findings and Themes

Knowledge, Beliefs, and Attitudes

Knowledge, beliefs, and attitudes in regard to HPV, the vaccine, and the negative implications associated with the disease were present in qualitative studies in the literature. Parental refusal and gender, more specifically refusal in male adolescents, were the most common topics in regards to knowledge, beliefs, and attitudes about the HPV vaccination [17-20].

The major finding from Clark was that half (51%) of parents of adolescent males were classified as unlikely to vaccinate [19]. This statistic was gathered from a nationally representative parental report online survey, which gathered data from 809 parents of sons aged nine through 17, and was mostly due to the fact that these parents felt they lacked knowledgeable insight from their child's provider. Regardless of being unlikely to vaccinate, this group still supported adolescent vaccinations in general. Those classified as likely to vaccine (39%) felt that their son's primary care provider was "knowledgeable about the HPV vaccine and did a good job explaining its purpose" [19]. This statement was evidence that provider communication is vital to parents and patients about vaccinations, and, in particular, the HPV vaccine. It cannot be concluded that parental report in Clark was actually due to missed opportunities by the provider to discuss HPV or if a confounding principle was present [19].

In Kinder, twenty-two parents were surveyed about their opinions about the vaccine, and the majority responded that the vaccine was too new and further research was needed. Although this evidence was applicable to the improvement initiative, the small size limited the generalizability of the results. This study was a mixed-methods study in which a confidential and anonymous survey was provided to the parent or guardian in a private room during the adolescent office visit [17].

Lu included evidence about male participants in regards to the HPV vaccination. While some evidence from this article related to cultural differences, there was also some suggestion of reasoning for refusing the vaccination. The main reasons for refusal included the vaccine not being recommended by a provider, the vaccine was thought to be unnecessary, and a lack of knowledge about the vaccine. These reasons were most consistent with other findings indicating "parents may have limited knowledge regarding HPV vaccine and ACIP [Advisory Committee on Immunization Practices] recommendations" [20].

The study by Reynolds & O'Connell recruited parents of adolescents aged nine through 18 via e-mail, which directed the parents to an online survey. Participants were given two weeks to complete the survey, with follow-up surveys sent at weeks four and six. The survey explored susceptibility, benefits, barriers, and cues to action in relation to the HPV vaccination and parental knowledge, beliefs, and attitudes. There was significance in the evidence indicating that parents were more likely to vaccinate if their child was an older adolescent. Attitudes toward the vaccine, including that receiving the vaccine would lead to promiscuous sexual behavior or that the vaccine would be painful or have negative side effects, were found to be significant factors in reasons for parental refusal ($p < 0.001$, 95% CI = 1.449-2.202). Additional significant values that related to parental influence on vaccination included susceptibility ($p = 0.001$, 95% CI = 1.066-1.275), social norms ($p = 0.009$, 95% CI = 1.030-1.238), and healthcare providers as a source of information ($p < 0.001$, 95% CI = 3.806-33.751). The definition of susceptibility pertained to whether or not parents believed that the vaccination would prevent their child from acquiring HPV-related illness.

Interventions to Alter HPV Vaccine Rate

Interventions have been described in research to aid in increasing the rate of vaccinating adolescents eligible to receive the HPV vaccine. Increasing availability of educational resources were implemented in several studies through the use of an interactive and age-appropriate information via electronics on an iPad, culturally-sensitive and accessible media interventions, and by providing education materials and patient reminders via telephone, text, or e-mail [13, 21-24].

The results from Dempsey, in which an iPad was used to educate via electronic media, did not show a high rate of success [21]. The intervention in DiClemente could be categorized into the cultural differences theme, but the intervention is more relevant for this quality improvement project [22]. Participants were placed into intervention and comparison (control) groups to determine if a media-based intervention, titled Girls on Guard, was efficient in increasing the initial uptake of the HPV vaccine series. Participants in both groups correctly identified facts about HPV and cervical cancer. The intervention participants reported believing they were at risk for HPV and developing cervical cancer more than comparison participants ($p < 0.05$). Intervention participants also reported worrying about getting cervical cancer ($p=0.05$). The participants in the intervention group stated that they would be more likely to get the HPV vaccine that day (34.3%). Only 19.4% of those in the comparison group stated that they would be more likely to receive the vaccine.

Although the rates of HPV vaccination were higher at the clinics placed in the training session intervention group in Sanderson, the rates were not significant after adjusting for age and mother's education [13]. This study did conclude that providing education materials and patient reminders could effectively increase the HPV vaccination uptake rate [24]. Tiro concluded that an educational brochure did not increase the initial uptake of the HPV vaccine in the intervention group compared to the control group (42% vs. 40.6%). The study did find that Hispanic patients were likely to vaccinate after receiving the educational brochure (AOR=1.43, 95% CI=1.02-2.02), but this was not true for African American patients (AOR=0.64; 95% CI=0.41-1.31). This data could also be categorized into the cultural difference theme. This data was significant and should be used in future research as evidence that race may play a

role in acceptance of education about HPV vaccination initiation and completion.

The study by Fiks, Luan, and Mayne described the implementation of a Maintenance-of-Certification (MOC) Requirements course for providers [25]. Twenty-seven primary care pediatricians were enrolled in the course that focused on current vaccination rates, information about vaccine safety and efficacy, and how to overcome barriers to vaccine administration. Completion of the course significantly increased the pediatricians' opportunities to inform their patients about HPV by 5.7 percentage points. This statistic was only significant in regards to the first dose of the vaccine, though. Regardless, this is evidence-based information that could be utilized to support a continued increase in HPV vaccination initiation.

The AAP has developed an HPV Champion Toolkit that includes four key points for improving the vaccination rates. These four points include recommending the vaccine to patients 11-12 years old, guaranteeing protection, using proper vocabulary, and educating about the new two-dose recommendations previously described [26]. The toolkit contains educational posters and brochures for printable use in the clinic, data tables for numerical representation of the 9vHPV national vaccination rate, and stories of success from providers who have used the toolkit in their practices. Opportunities for Certified Medical Education (CME) and Maintenance of Certification (MOC) are also available in the toolkit.

Cultural Differences

Within evidence-based literature on the HPV vaccine, studies showed cultural differences related to acceptance of the vaccine. While the clinic in which this project occurred sees mostly Caucasian, Hispanic, and African American patients, the data that emerged from the literature search may pertain to these cultures, even though these specific cultures were not always explored. Nevertheless, it is important to be mindful of cultural differences that may arise when caring for minority populations. Ethnic diversity and medical setting were two of the major themes in regards to culture that could affect HPV vaccine initiation [20, 27-29]. One way in which cultural differences were incorporated into this quality improvement project was by having educational information available in both English and Spanish. Additionally, one MA and one physician fluent in Spanish allowed a more personalized conversation addressing questions or concerns about the vaccination.

The Asian American population at Smyrna Pediatrics is low, but Kim explored the culture of Korean Americans in regards to HPV vaccination perceptions. Four focus groups were held in a Korean American church [27]. The four themes that emerged from the focus groups included perceptions and beliefs about HPV vaccination, awareness and knowledge about HPV vaccination, promoting HPV education and information-sharing, and patterns of decision-making about HPV vaccination. These themes qualified this article to be categorized into the perceptions, attitudes, and beliefs about HPV, but the cultural difference is more significant for the purpose of this DNP project proposal. Overall, it was found that Korean American women favored the HPV vaccine but wished to obtain more information about HPV in General. "Culturally tailored HPV education programs…are suggested strategies to promote HPV vaccination," [27]. The evidence suggested that attention to cultural differences and the ability to tailor education to specific cultures could improve acceptance of and initiation of the HPV vaccine.

Lu discovered that initial HPV vaccine uptake (>1 dose) was significantly higher in Hispanic (49.6%) and non-Hispanic black (42.2%) adolescent males compared to non- Hispanic white adolescent males (26.7%). Age, number of visits to primary care, mother's marital status, vaccination history, mother's education, poverty level, and geographical location also played a role in likelihood of being vaccinated [20]. These cultural differences were similar in previous studies with adolescent females, increasing the generalizability of these results.

Kepka found that those seen in hospital or private facilities were more likely to complete the HPV vaccine (PR=1.29, 95%CI=1.02-1.62; PR=1.22, 95%CI=1.01-1.48) compared to those seen in public clinics [28]. Additionally, adolescents were categorized by their age, with one group of girls in 6-8th grade and the remaining in 9-12th grade. The findings suggested that, in accordance with cultural variations, those in high school (9-12th grade) were more likely to complete the vaccination series compared to their younger counterparts (PR=1.81, 95%CI=1.58-2.06). Overall, older adolescent females seen in private or hospital facilities were more likely to complete the HPV series.

In the metropolitan versus non-metropolitan study by Monnat no significant differences were found in the vaccination rate between patients seen in metropolitan versus nonmetropolitan areas [29]. Cultural differences were further explored in subgroups. These included low- and high-income girls, girls whose mothers' did not complete high school, girls whose mothers' completed college, and girls whose mothers' experienced financial barriers [29].

There were important subgroup differences. Among low-income girls and girls whose mothers did not complete high school, those in non-metropolitan areas had significantly higher probability of vaccine initiation than those in metropolitan areas. Among highincome girls and girls whose mothers completed college, those in metropolitan areas had significantly higher odds of vaccine initiation than those in non-metropolitan areas.

Girls from non-metropolitan areas whose mothers were considered to be in a low-socioeconomic status were less likely to initiate vaccination in comparison to those in metropolitan areas who also faced financial barriers [29].

Barriers

Guerra approached 115 women randomly at three community based health events of these women, 41 were within the age range to receive the 9vHPV vaccine [14]. Only 14.63% had received the vaccine, although 73.17% of the women were aware that the vaccine existed. The majority of the women were Hispanic (75.25%) or African American (12.86%). These results enhance the need for quality patient and provider education and communication [14]. Additionally, this article represents the cultural differences present in certain populations relevant to the study.

Kessler identified the need for education to overcome barriers to the HPV infection itself [16]. Methods for promoting the vaccination included using the term recommended for parents of all 11 and 12 year-old patients. Healthcare professionals must also address the importance of not only initiating the series, but of completing the series as well.

Kulczycki addressed patterns of physician-perceived barriers to discussing the 9vHPV vaccine [15]. The study was limited to 11-12 year-old girls but can be generalized to the eligible adolescent population. A questionnaire was distributed to the providers in primary care facilities. The distribution of the surveys was randomized. "Overall, 75.8% of PCPs (primary care providers) reported that they initiated discussion on the topic with unvaccinated female patients at least 50% of the time" [15]. Three communication barriers were aggregated from the data and identified by the PCPs including unwillingness or reluctant to discuss the vaccine, limited awareness of the vaccine, and inadequate access or use of healthcare [15]. Values were not provided for these aggregates.

Current Evidence

Strengths

Generalizability and consistency in results among the evidence are strengths of this literature search. Cultural adaptability, multiple interventions implemented, and an overall synthesis of existing perceptions of HPV and the HPV vaccine are helpful in categorizing potential hesitancies for the vaccination at Smyrna Pediatrics. The use of the iPad as a means of education showed the most use by patients and their parents or guardians in Dempsey [21]. Smyrna Pediatrics has plans to have iPads available in the near future in waiting rooms, which may contribute to availability of educational resources in the clinic. Representation of male adolescents is strength, as this population is often neglected in regards to promoting 9vHPV [19, 20].

The inclusion of racial and ethnic diversity in studies is certainly strength of this evidence. South African, Hispanic, African American, and Korean cultures were explored, offering the opportunity to tailor HPV vaccine perceptions and education materials [22, 24, 27, 30]. As stated previously, Korean American is not a culture seen widely at Smyrna Pediatrics. Nevertheless, the inclusion of cultural differences obtained in evidence is relevant and relates to the need for cultural sensitivity in relation to healthcare. The results from the literature can be generalized accurately to represent the population at Smyrna Pediatrics, as several articles included minority populations, such as Hispanic and African American, which compose a high percentage of the population at Smyrna Pediatrics.

Weaknesses and Limitations

As stated previously, a majority of the articles utilized data from national surveys. The use of national surveys improves generalizability but limits the reliability of the data because survey response rates are generally low. Sample sizes were still small in studies that did not use national survey data. Participant numbers included twenty-two participants in Kinder, twenty-four participants in Francis and Katz, twenty-five girls in Mullins, Widdice, Rosenthal, Zimet, and Kahn, twenty-six Korean Americans in Kim et al, twenty-seven pediatricians in Fiks et al, and only three practices in the Dempsey study [13, 17, 21, 25, 27, 30, 31]. Low response rates were also evident in, with 51.1% of Landline households responding and 23.3% of cellular phone users responding [20]. Because of the low response rate, the vaccine coverage statistics of Hispanic (49.6%) and non-Hispanic black (42.2%) adolescent males compared to non-Hispanic white adolescent males (26.7%) may be inaccurate [20]. Non-randomization in Sanderson et al. was a major limitation [13]. Focus groups were not consistent, as facilitators were different geographically in the findings from Francis and Katz [30]. Further research should be explored about the use of educational materials for parents and adolescents without limiting to one method of technology, such as only an iPad as was reported by Dempsey [21].

Generalizability of Monnat's study was limited because it was over-representative of Hispanics and under-representative of African Americans [29]. This study also only covered nine U.S. states. Dempsey et al also had limited geographical and cultural diversity [21]. Although DiClemente et al, and Tiro et al, provided information for a minority population; this is also a limitation as it inhibits the generalizability of the results [22, 24]. Additionally, patient provider interactions were not able to be observed, which limits generalizability of why the adolescent chose to not be vaccinated in some instances. Conclusions cannot be accurately drawn that findings from participants in Mullins et al, were truly from a lack of knowledge about the topics or simply the result of discomfort or inexperience related to the topics [31]. Other limitations include that all studies except for one were performed in the United States [30]. This was a filter chosen to narrow the results within the literature search, but it can also inhibit the plethora of available data in regard to this topic.

Expert Opinions

According to the Centers for Disease Control and Prevention, routine vaccination at age 11 or 12 years has been recommended by the Advisory Committee on Immunization Practices (ACIP) since 2006 for females and since 2011 for males [6]. This routine vaccination is recommended in order to administer vaccinations prior to entry into seventh grade along with the required MMR and meningitis vaccines. Despite this recommendation, the vaccine can be administered as early as 9 years of age. Recently, a two dose HPV vaccination has been approved by the Food and Drug Administration (FDA). Although there is limited data on this topic, it was not excluded from the literature search and review.

Concepts

According to Stanford Children's Health, adolescence ranges from age 13 to 18. For the purpose of this project, adolescence also included patients as young as nine, as the 9vHPV vaccine can be administered as early as age nine [32, 33].

The United States Department of Health and Human Services (HHS) defines a vaccine as "a product that produces immunity from a disease" [34]. Gardasil9 [9vHPV] is a nine-valent vaccine for protection against HPV, that covers the 9 most common types of HPV, including 6, 11, 16, 18, 31, 33, 45, 52, and 85 [2]. Previously, Gardasil4 was used, which was a quadrivalent vaccine only covering types 6, 11, 16, and 18 of HPV. Cervarix is an additional brand name, but it is no longer used because it only covers the types of HPV associated with cancer, strands 16 and 18 [2].

Patient education for this project is defined as the standardization of communication and information provided to patients and their parents or guardians. Because the forms of patient education will be developed specifically for this project, the definition is defined by the developer. Thus, for the purpose of this project, patient education is defined as the standardization of communication when delivering information about HPV, the virus and the vaccine, to patients and their parents or guardians.

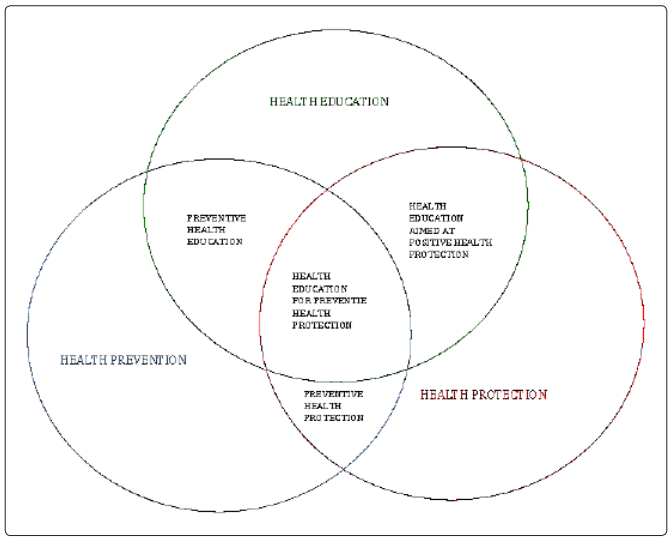
Framework

In order to implement education to increase the initiation rate of the

HPV vaccination, it is important to have a theoretical framework in mind. In regards to this quality improvement project, the Tannahill Model of Health Promotion applies. This model was developed by Andrew Tannahill in the mid-1980s and incorporates health education, health protection, and prevention of diseases and illnesses as a means to support health promotion [35]. The Tannahill Model of Health Promotion was further explored in Madi and Hussain [36].

According to this model, Prevention focuses on services such as immunization…health education is aimed at influencing behavior on positive health grounds and health protection deals with regulations and policies. Preventive health education includes educational efforts to influence lifestyle [such as] efforts to encourage the uptake of preventive services.

Appendix C: The Tannahill Model Presented as a Venn Diagram to Show Overlap Among Health Education, Health Prevention, and Health Protection



Methodology

Participants

The participants for this project included the providers and staff at Smyrna Pediatrics. The majority of patient education about vaccinations was presented by the providers, who are two physicians and one Pediatric Nurse Practitioner. The remaining staff members included two medical assistants (MAs). The two receptionists were responsible for scheduling follow-up visits to complete the 9vHPV series. The office manager did not take part in any patient interaction or standardized education, but was aware of the quality improvement project. Consent was not required for this type of project because the implementation did not involve human subjects but instead the development of a standardized education and communication program. While the hope was to increase the initiation rate of the HPV vaccination [9vHPV], the patients were not actually subjects in the implementation. All adolescents were to receive the same education in order to create a positive habit by the staff, regardless of type of visit. Materials to assist with standardized education were already developed by the AAP and the CDC and available for use. These materials were available for public use from the CDC and are part of the HPV Champion Toolkit [23]. They were available for patient and their parent or guardian education and were provided in both English (See Appendix A1) and Spanish (See Appendix A2).

This model uses a Venn diagram as visual representation demonstrating where the three areas of health education, health protection, and prevention overlap (See Appendix C). The overlapping results in seven areas of health promotion: preventive services, preventive health education, preventing health protection, health education for preventive health protection, positive health education, positive health protection, and health education aimed at positive health protection. Preventive services for the purpose of this project were the 9vHPV vaccine. Preventive health education included the patient education process to standardize communication about the HPV virus and vaccine. Preventive health protection was the exploration of 9vHPV's safety and efficacy incorporated into the education model. All of these areas encompass positive health education and protection.

Project Design

The Model for Improvement (MFI) was utilized during the implementation of the scholarly project. Within the MFI, the Plan, Do, Study, Act (PDSA) cycle exists. The MFI asks the following three questions: 'what are we trying to accomplish?', 'how will we know that change is an improvement?', and 'what change can we make that will result in improvement?' [37]. After answering these questions, the PDSA cycle was used to test the change [37].

- What are we trying to accomplish? The aim for this quality improvement initiative was to increase the initiation rate of the 9vHPV vaccination by 20%, from 3.6% to 4.4%, within 4 weeks at Smyrna Pediatrics.
- How will we know that change is an improvement? Success was determined by comparing HPV vaccine initiation data before and after implementing a standardized patient education and communication program.
- What change can we make that will result in improvement? The change itself was the introduction of a standardized education and communication program that addressed the 9vHPV vaccine as well as parental concerns, safety of the vaccine, and the importance of early vaccination.

Setting

This DNP scholarly project took place in a private pediatric practice outside of Nashville, Tennessee. The private practice consists of ten employees, five of whom were responsible for implementing this quality improvement project. Three providers and two Mas were educated to deliver standardized education to adolescents and their parents or guardians at every adolescent visit. Prior to implementation, a one-hour meeting was held in which the providers and MAs were given a communication script (See Appendix B), a reminder card (See Appendix D), and education handouts (See Appendix A1, A2). Documentation of education and communication was to be recorded in the notes section of the patient's chart.

Appendix D: HPV Initiative Reminder Document for Medical Assistants and Providers

HPV Initiative
Recommend the vaccine
Answer questions
Provide education document
Include safety and efficacy info
Administer the vaccine
Don't get discouraged if a parent refuses the vaccine

Plan

The aim of this project was to improve the initiation of the 9vHPV vaccine by 20%. Communication was vital for the implementation of this project. A standardized script was created so that all conversations between healthcare professionals and patients and their parents or guardians included the wording of the 9vHPV being recommended rather than optional (See Appendix B). In August, before the project implementation date, the staff at Smyrna Pediatrics was given information on what the standardized education consists of and how to present it to parents and guardians at each and every adolescent visit. This presentation included a script so that communication was the same regardless of which provider or healthcare professional discussed 9vHPV with patients and their parents or guardians. Educational material, *HPV Vaccine for Teens and Preteens*, from the CDC was the standard handout given to each Adolescent and their parent or guardian (See Appendix A1, A2). The handout is part of the HPV Champion Toolkit and is available for use by the public at no charge. Communication scripts were also developed by the project team leader (See Appendix B) to prompt the providers and staff about how to talk with patients and their parents or guardians about the vaccine. In addition to the scripts, a small reminder document was distributed to providers, medical assistants, and receptionists to have at their desk to serve as reminders to implement the quality improvement initiative (See Appendix D). The reminder was adapted from the document titled *Changing the Future: Preventing HPV Cancers* [23]. Ultimately, the hope was that the standardized education and communication would increase the initiation rate of the 9vHPV vaccination in adolescents ages nine through 18. This quality improvement project was implemented over a one month time frame at each adolescent office visit. After IRB approval was granted for the project, baseline data collected included the number of 9vHPV vaccinations administered in September of the past year (2016) divided by the total number of patients ages nine through 18 who were eligible for the vaccine. The same formula was used to determine the rate of HPV vaccine initiation after implementation of the improvement initiatives. Adolescents who initiated or completed the 9vHPV series elsewhere were excluded from the QI initiative.

Do

The IRB application was submitted and granted approval as a non-research quality improvement initiative by the IRB committee. Information for the standardized education and communication was provided at a staff meeting late August 2017.

The quality improvement project was implemented from September 5, 2017 through September 29, 2017. Providers and medical assistants (MAs) were responsible for educating adolescents and their parent or guardian at each office visit, whether a sick visit or well child exam. This allowed for more adolescents to be targeted for sufficient comparison data. The data were collected via chart reviews by the office manager and project team leader. The data were then transferred to a personal excel spreadsheet that is password protected. Data were entered on the spreadsheet by identifying the week of the visit only, 1 through 4, with no other identifiers to ensure HIPAA compliance. The excel spreadsheet was updated weekly, with a weekly comparison to baseline data to show steady changes. Run charts were produced weekly as well, allowing for visual display for providers and staff review. Information for the standardized education and communication was provided at a staff meeting late August 2017.

Study

After implementation, data were analyzed to determine if there was an increase in initiation of 9vHPV vaccine. Weekly percentages were calculated to determine the rate of 9vHPV vaccination initiation. Run charts were created weekly, comparing weekly data to baseline data. A total percentage was calculated for all of the 9vHPV vaccinations administered over the course of the four week implementation, dividing the total number of vaccines administered (n = 5) by the total number of eligible adolescents seen (n = 125). The post implementation percentages were compared to the baseline data to determine if a change occurred. The data were compared to the original aim of a 20% increase, from 3.6% to 4.3%, in vaccine initiation rate from baseline.

Act

Based on the results, a plan was developed to continue to educate and communicate with patients and their parents or guardians utilizing the standardized education and communication program at Smyrna Pediatrics. Although the results did not show a 20% increase, the benefit of standardized education and communication could show more improvement over a longer implementation period. The standardized education and communication program can also be applied to other recommended vaccinations, such as the influenza and meningitis B vaccines.

Data Collection

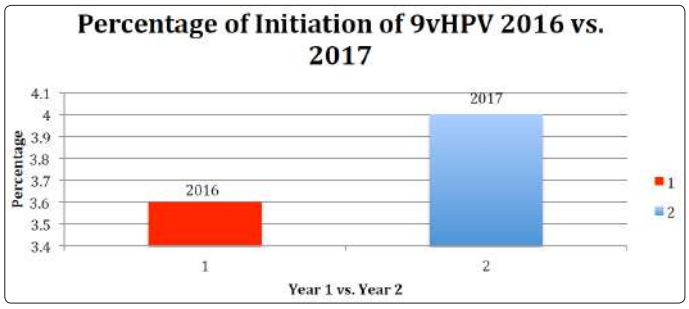
Baseline data were retrieved to determine a baseline rate of HPV vaccinations initiated for patient's ages 9-18 years old from September 2016. The office manager and project team leader gathered the data electronically via the billing and management system. The system allowed the office manager to select ages for the patient visit, which was an age nine through 18. Patients were excluded from the data if the system noted that they had received their second or third dose of 9vHPV within the allotted time frame. The data were compared to the data gathered during the project, which relayed the rate of HPV vaccinations initiated after the standardized education and communication program was implemented. Data were gathered in the same manner by the office manager and project team leader at weekly intervals via the management and billing systems, excluding patients who already received their first dose of 9vHPV or were in the office receiving their second or third dose of the vaccine.

Data Analysis and Results

Prior to implementation, the data showed a 3.6% initiation rate for the 9vHPV vaccination for patients ages 9 through 18 in September 2016. This project identified 221 adolescent patients ages 9 through 18 eligible to receive 9vHPV over four weeks of implementation in September 2017. The data were gathered by weekly reports generated by the office manager to determine how many eligible adolescent patients were seen and how many of them received the first dose of 9vHPV. Participant eligibility excluded 96 adolescents from the study because they had already received their first dose of 9vHPV or was in the office to receive their second or third dose of the vaccine. Data were displayed on run charts, which were updated weekly over the four week implementation period. The rate of HPV vaccine initiations were calculated and compared to the baseline data. The data were then entered into a Microsoft Excel spreadsheet on a password-protected laptop to determine if there was a percentage increase in initiation of 9vHPV. An overall percentage was calculated by dividing the total number of eligible adolescents who received 9vHPV (n = 5) by the total number of eligible adolescent seen at the clinic (n = 125). In order

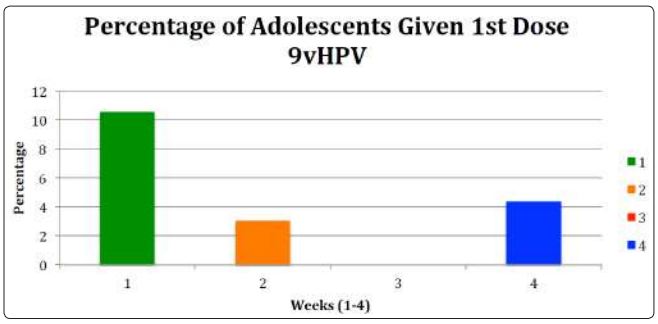
to determine if improvement was made, comparative analysis was utilized. The educational material was available for every adolescent who visited the clinic, but it is not known whether or not every patient received this material. Every adolescent who visited the clinic received the same standardized education and communication, so no patient identifiers were utilized Of the 125 eligible adolescents seen during the four-week implementation period, 4% (n = 5) agreed to receive the 9vHPV vaccine. With a baseline of 3.6% (n = 4), there was an 11.1% increase of initiation of 9vHPV. This comparison of data from the same month of the previous year allowed the interpretation to be more accurate due to potential annual similarities for vaccine administration (Table 1). Provides visual representation of the overall initiation rates of 9vHPV.

Table 1: This table compares the data from 9vHPV initiation rates from September 2016 to the 9vHPV initiation rates from September 2017



Weekly run charts were constructed to visually represent weekly initiation rates of 9vHPV. The weekly run charts, discussed with clinical staff, served mostly as a reminder to continue to implement the project. Nineteen adolescents were seen by a provider during week one of implementation who were deemed eligible in that they had not already initiated the 9vHPV series. Of these nineteen eligible patients, 10.5% (n = 2) agreed to receive their first dose of 9vHPV (Table 2). In week two, thirty-three patients were seen who were eligible for the standardized education and communication program, of these, 3.0% (n = 1) were given 9vHPV (Table 2). Twenty-seven eligible adolescents were seen during week three, but 0% (n = 0) of the patients were administered the vaccination (Table 2). During the last week of implementation, a total of forty-six eligible adolescent patients were seen at Smyrna Pediatrics. Only 4.3% (n = 2) of these patients received the first dose of 9vHPV (Table 2). Providers were surprised by the low initiation rates but were unable to provide evidence as to what barriers may have existed throughout the implementation period.

Table 2: This table represents the individual percentages of adolescents who were administered their first dose of 9vHPV over the four-week implementation



Discussion

Relationship of Results to Framework/Aims/Objectives

The Tannahill Model, which incorporates health education, health protection, and health prevention, was beneficial in the development and implementation of this project [35]. As stated in the framework outline of this scholarly project, the purpose of the improvement initiative was to educate patients and their parents or guardians in a standardized manner so that the importance of 9vHPV as a prevention strategy and as protection from the human papillomavirus later in life could be communicated effectively. The use of standardized education documents presented to all patients and their parents or guardians established health education as the mainstay of the project and provided information about the importance of prevention and protection from the virus that the vaccine prevents.

The aim of this scholarly project was to increase the initiation rate of 9vHPV to those adolescent patients ages 9 through 18 who had not yet received the first dose of the vaccine and did not have any contraindications to the vaccine. The implementation of a standardized education and communication program was the incentive for providers and medical assistants to have the same conversations with patients and their parents or guardians so that the communication was consistent. Although a 20% increase was not seen throughout the implementation, there was an 11.1% from the baseline of 3.6% in September 2016 to 4% in September 2017.

The literature review provided an outline of initiatives found to increase the awareness and education of 9vHPV and identified some barriers to administration of the vaccination. An additional literature search was conducted to find barriers of the vaccine in peer-reviewed studies and the topic was discussed at the practice to determine any barriers that were noticed frequently over the course of the 4 weeks.

While these barriers were briefly discussed in Reynolds et al, Fiks et al, and Monnat et al, the additional literature search specified these barriers in a more detailed manner [18, 25, 29]. “These barriers can be identified as parental, provider or system-level” [16]. They can include a lack of knowledge, parental refusal, or a lack of consistent, standardized provider recommendation. While this project did not analyze results by race or gender, there are large Hispanic and African American populations at Smyrna Pediatrics. Data from Guerra et al. suggested that both “Hispanic and African American women have the highest incidence of cervical cancer…[and] increasing HPV vaccination rates will help reduce [this] burden” [14]. Evidence demonstrates that the immunization rate can be increased by an improvement in education and communication, which was the basis for this scholarly project [14]. In Kulczycki et al, there were three main communication barriers for the administration of the vaccine, which included “patients’ and parents’ unwillingness/reluctance to discuss HPV...their limited awareness of it, and inadequate access/use of healthcare” [15]. Overcoming these barriers and having evidence-based literature to determine how to overcome these barriers would be beneficial in future innovations of this scholarly project.

Strengths and Limitations

One of the biggest strengths for this project was the development of an evidence-based standardized education and communication program that can be utilized for all recommended vaccines, such as 9vHPV and the influenza vaccine. While neither is required by Tennessee school policy, they are both recommended by the CDC

[3]. The small size of the practice and sample may be seen as a limitation, but it can also be strength. Fewer patients may allow for a stronger relationship and increased trust between the provider and patient. Patient/provider trust could lead to a better sense of understanding the benefit of the vaccination for health prevention and protection.

The limitations seem to outweigh the strengths this scholarly project. First and foremost, the sample of adolescents eligible to receive the standardized education and communication vaccine was small and limited to a short course of implementation. This project may have seen a larger increase in initiation rate of 9vHPV if it had been conducted for more than four weeks. There was a limitation of regulating the communication and ensuring that each participant was given the standardized education and communication. Although the project was discussed in detail in meetings with providers and staff, the project leader was not on-site every day to remind participants about the initiative. Weekly reminders about the project were sent via e-mail to remind providers and medical assistants that the project was still occurring. This led to the project leader simply trusting that the project was being implemented, which may have significantly decreased the number of adolescent patients who were exposed to the standardized Education and communication. It was also discussed to document that the standardized education and communication took place in the notes section of the patient charts, but this was not measured or tracked over the course of implementation. Lastly, the implementation may have been more successful if it had occurred during the height of vaccination season, which usually occurs prior to the school year, between July and August when children are receiving vaccines required for entry into Tennessee schools.

Impact of Results on Practice and Future Implications

Even though the practice did not see a 20% increase in initiation rates of 9vHPV, the implementation of results over a longer period of time may prove to be more effective for the practice's increase of vaccination rates overall. Smyrna Pediatrics is no longer accepting patients who do not vaccinate as is required by the CDC, AAP, and ACIP. This practice may lead to an increase in recommended vaccinations, such as 9vHPV and influenza. The standardized education and communication program will hopefully be maintained as the norm at the office. The project leader is employed by the pediatric practice, so she will work to maintain the standardized education and communication program.

Not only would future implications assist in the advancement of vaccination rates at Smyrna Pediatrics, but they would increase vaccination rates for the state of Tennessee. An article posted on October 12, 2017 in MedPage Today stated that most kindergarteners were upto-date with their required vaccinations [38]. Four states, one of which was Tennessee, had at least a 1.5 percentage increase in coverage for all reported vaccines over the 2016-2017 school years [38]. With improvement in education and communication for all vaccines, this percentage should only continue to rise. A study by the CDC reported the rate of HPV-associated cancers over the years 2009-2013. Of the fifty states and Puerto Rico, Tennessee has the fifth highest rate of HPV-associated cancers [39]. "While there is no known cure for HPV, prophylactic vaccination provides an effective method of primary prevention against HPV related diseases" [16]. An increase in the initiation and completion of HPV vaccination rates would lower the rate of HPV-associated cancers in the state.

Dissemination of Findings

According to the American Association of Colleges of Nursing, there are eight Essentials of Doctoral Education for Advanced Nursing Practice [40]. Of these, Essential III pertains to the scholarship and evidence-based practice of a DNP prepared provider. Within this essential, it is stated that the graduate will be able to "apply relevant findings to develop practice guidelines and improve practice and the practice environment" [40].

The written project will be submitted to several parties. First, the results of the scholarly project will be shared with Smyrna Pediatrics. Additionally, the results will be shared with Vanderbilt University School of Nursing, either by orally presenting or by having written work used as an exemplar for future DNP students. Upon completion of the project, it will also be submitted as an abstract and peer-reviewed article to journals appropriate to this topic, including but not limited to The *Journal of Adolescent Health* and The *Journal of Pediatric and Adolescent Gynecology*. The *Journal of Adolescent Health* is associated with the Society for Adolescent Health and Medicine (SAHM), which is an organization committed to the improvement of health and well-being of adolescents [41]. This directly correlates to the framework of the quality improvement initiative, in which the Tannahill model was utilized to improve the health education and prevention of the adolescent population. Additionally, the *Journal of Pediatric and Adolescent Gynecology* was selected because it incorporates both clinical-based and research-based aspects of pediatric and adolescent gynecology [42]. Vaccinations are relevant to the molecular and cellular side of science, and the standardized education and communication program pertains to clinical-based studies [43-45]. The human papillomavirus is a gynecological health concern, categorizing it into gynecology.

Conclusion

The major goal for this DNP scholarly project was to educate the adolescent population and their parents about the importance of 9vHPV in an effort to prevent human papillomavirus infection in this population. The project was developed as a standardized education and communication program at a small private practice outside of Nashville, Tennessee [9]. Malo et al stated that according to the President's Cancer Panel, "physicians [should] frame that the HPV vaccine is a cancer-preventing vaccine, emphasize vaccine safety and efficacy, and underscore importance of vaccinating at age 11 or 12 years" [9]. According to the CDC, 9vHPV is safe, effective, and provides lasting protection against the infections and cancers most commonly caused by HPV [3]. While the vaccine is not required, it is highly recommended by professional organizations such as the CDC, AAP, and ACIP. Developing and utilizing standardized education and communication can eliminate confusion and diminish negative opinions about this preventive health care service and assist in overcoming barriers to vaccination that exist in the pediatric and adolescent patient population.

References

1. Hariri S, Dunne E, Saraiya M, Unger E, Markowitz L (2011) Chapter 5: Human Papillomavirus. In VPD Surveillance Manual. Atlanta, GA: Centers for Disease Control and Prevention 5: 1-8.
2. National Cancer Institute (2016) Cancer Vaccines.
3. Center for Disease Control and Prevention (2017) HPV Vaccine for Preteens and Teens.
4. Chedekel L (2016) Many adolescents still not receiving HPV vaccine | SPH | Boston University.

5. Centers for Disease Control and Prevention (2013) Ready-to-Use STD Curriculum for Clinical Educators.
6. Centers for Disease Control and Prevention (2016) CDC recommends only two HPV shots for younger adolescents.
7. Johnson KL, Lin M, Cabral H, Kazis LE, Katz IT (2017) Variation in human papillomavirus vaccine uptake and acceptability between female and male adolescents and their caregivers. Journal of Community Health 42: 522-532.
8. Centers for Disease Control and Prevention (2015) many adolescents still not getting HPV vaccine.
9. Malo TL, Ali KN, Sutton SK, Perkins RB, Giuliano AR, et al. (2016) The content and context of physicians communication with males about human papillomavirus vaccination. Human Vaccines & Immunotherapeutic 12: 1511-1518.
10. Pils S, Joura E (2015) from the monovalent to the nine-valent HPV vaccine. Clinical Microbiology and Infection 21: 827-833.
11. National Institution of Allergy and Infectious Disease (2014) Vaccine Benefits.
12. Melnyk BM, Fineout-Overholt E (2015) Evidence-based practice in nursing & healthcare: a guide to best practice. Philadelphia: Wolters Kluwer Health.
13. Sanderson M, Canedo JR, Khabele D, Fadden MK, Harris C, et al. (2017) Pragmatic trial of an intervention to increase human papillomavirus vaccination in safety-net clinics. BMC Public Health 17: 158.
14. Guerra R, Bhalwal A, Ibarra C, Joova N, Robazetti SC, et al. (2017) Awareness of HPV vaccinations and barriers to vaccination administration among underserved women. Gynecologic Oncology 147: 233.
15. Kulczycki A, Qu H, Schewchuk R (2016) Primary care physicians' adherence to guidelines and their likelihood to prescribe the human papillomavirus vaccine for 11 and 12-year-old girls. Women's Health Issues 26: 34-39.
16. Kessler TA (2016) Human Papillomavirus Infection: Prevention, Barriers to Vaccination, and the Need for Education. Clin Res Infect Dis 3: 1023.
17. Kinder FD (2016) Parental refusal of the human papillomavirus vaccine. Journal of Pediatric Health Care 30: 551-557.
18. Reynolds D, O'Connell KA (2012) Testing a model for parental acceptance of human papillomavirus vaccine in 9- to 18-year-old girls: A theory-guided study. Journal of Pediatric Nursing 27: 614-625.
19. Clark SJ, Cowan AE, Filipp SL, Fisher AM, Stokley S (2015) Parent HPV vaccine perspectives and the likelihood of HPV vaccination of adolescent males. Human Vaccines & Immunotherapeutic 12: 47-51.
20. Lu P, Yankey D, Jeyarajah J, O'halloran A, Elam-Evans LD, et al. (2015) HPV vaccination coverage of male adolescents in the United States. Pediatrics 136: 839-849.
21. Dempsey AF, Maertens J, Beaty BL, O'leary ST (2014) Understanding how different recruitment strategies impact parent engagement with an iPad-based intervention to provide personalized information about adolescent vaccines. Journal of Adolescent Health 56: S7-S13.
22. Diclemente RJ, Murray CC, Graham T, Still J (2015) Overcoming barriers to HPV vaccination: A randomized clinical trial of a culturally-tailored, media intervention among African American girls. Human Vaccines & Immunotherapeutic 11: 2883-2894.
23. American Academy of Pediatrics (2017) Changing the Future: Preventing HPV Cancers.
24. Tiro JA, Sanders JM, Pruitt SL, Stevens CF, Skinner CS, et al. (2015) Promoting HPV vaccination in safety-net clinics: A randomized trial. Pediatrics 136: 850-859.
25. Fiks AG, Luan X, Mayne SL (2016) Improving HPV vaccination rates using Maintenance-of-Certification requirements. Pediatrics 137: e20150675.
26. American Academy of Pediatrics (2017) HPV Champion Toolkit.
27. Kim K, Kim B, Choi E, Song Y, Han H (2015) Knowledge, perceptions, and decisionmaking about human papillomavirus vaccination among Korean American women: A focus group study. Women's Health Issues 25: 112-119.
28. Kepka D, Ding Q, Warner EL, Spigarelli MG, Mooney K (2015) High school females and those with other vaccinations most likely to complete the human papillomavirus vaccine. Preventive Medicine Reports 2: 79-83.
29. Monnat SM, Rhubart DC, Wallington SF (2016) Differences in human papillomavirus vaccination among adolescent girls in metropolitan versus non-metropolitan areas: Considering the moderating roles of maternal socioeconomic status and health care access. Maternal and Child Health Journal 20: 315-325.
30. Francis SA, Katz ML (2012) The HPV vaccine: A comparison of focus groups conducted in South Africa and Ohio Appalachia. Maternal and Child Health Journal 17: 1222-1229.
31. Mullins TL, Widdice LE, Rosenthal SL, Zimet GD, Kahn JA (2015) Risk perceptions, sexual attitudes, and sexual behavior after HPV vaccination in 11–12 year old girls. Vaccine 33: 3907-3912.
32. Stanford Children's Health (2017) The Growing Adolescent.
33. Center for Disease Control and Prevention (2017) HPV vaccine: Vaccinating your teen or preteen.
34. US Department of Health and Human Services (2011) Basics.
35. Tannahill A (2008) Health promotion: The Tannahill model revisited. Public Health 122: 1387-1391.
36. Madi HH, Hussain SJ (2008) Health protection and promotion. Eastern Mediterranean Health Journal 14: S15-S21.
37. Langley GJ, Moen RD, Nolan KM, Nolan TW, Norman CL, et al. (2009) the improvement guide: A practical approach to enhancing organizational performance. (2nd Ed.). San Francisco, CA: Jossey-Bass Publishing 2009: 512.
38. MedPage Today (2017) Kindergarteners' vaccines mostly up to date (MMWR).
39. Center for Disease Control and Prevention (2017) HPV-Associated Cancer Rates by State.
40. American Association of Colleges of Nursing (2006) The Essentials of Doctoral Education for Advanced Nursing Practice.
41. Journal of Adolescent Health (2017) Retrieved from http://www.jahonline.org/content/aims.
42. Journal of Pediatric and Adolescent Gynecology (2017) Retrieved from http://www.jpagonline.org.
43. Introduction to Health Promotion (2016) Lecture presented in Bangladesh, Bangladesh. Retrieved from https://www.slideshare.net/drnatasha2/introduction-tohealth-promotion-63728860.
44. Centers for Disease Control and Prevention (2016) HPV Vaccine Coverage Maps [Digital image].
45. Center for Disease Control and Prevention (2016) HPV (Human Papillomavirus).