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Implementation of the Human Papillomavirus Vaccine Among Health Professions Students

Emeka C. Nnabuife
University of the Incarnate Word, ecnnabuife@gmail.com

IMPLEMENTATION OF THE HUMAN PAPILLOMAVIRUS VACCINE AMONG HEALTH PROFESSIONS STUDENTS

by

EMEKA NNABUIFE

APPROVED BY DNP PROJECT ADVISOR/CLINICAL MENTOR

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Holly DiLeo PhD, RN, FNP-BC

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George Barajaz RN, FNP-BC

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TABLE OF CONTENTS

LIST OF FIGURES 6

ABSTRACT 7

STATEMENT OF THE PROBLEM 8

BACKGROUND AND SIGNIFICANCE 10

ASSESSMENT 14

Organization Readiness for Change and Stakeholder Engagement 16

PROJECT IDENTIFICATION 17

Purpose 17

Objectives 17

Anticipated Outcomes 18

SUMMARY AND STRENGTH OF THE EVIDENCE 18

METHODS 20

Project Intervention 20

ORGANIZATIONAL BARRIERS AND FACILITATORS 23

Ethical Considerations 24

RESULTS 24

DISCUSSION 26

Objective 1 26

Objective 2 27

Objective 3 28

Table of Contents—Continued

Objective 4 28

Limitations 28

Recommendations 29

Implications for Practice 30

REFERENCES 32

APPENDICES 35

Appendix A Education Pre-and Post-test 35

LIST OF FIGURES

Figure Page

1. Implementation Plan 20
2. HPV [wallet-size] Student Reminder Card 21
3. HPV Checklist 22
4. Computer Terminal Reminder Card 23
5. Percentage of Provider HPV Vaccine Recommendations 25
6. Percentage of Eligible Students Receiving the HPV Vaccine 26

Abstract

The human papillomavirus (HPV) is the most widespread sexually transmitted infection in America. College-aged students are a high-risk group for HPV transmission, but their HPV vaccination rates are low. The purpose of this evidence-based project was to implement an HPV vaccination program at a health science center university student health clinic to increase vaccination rates to meet the guidelines of the American College Health Association (ACHA) and the Centers for Disease Control and Prevention (CDC). The objectives of this project were as follows: 1) to educate providers and staff on the importance of the HPV vaccine; 2) to increase HPV vaccine recommendations to students by providers and staff; 3) to increase the HPV vaccination rate among students offered the vaccine; and 4) to increase the vaccination rate among all eligible students. Prior to implementation, 100% of staff were educated on the HPV vaccination guideline, resulting in a 33% improvement in test scores between pre- and post-tests. Of 205 student visits, 10.7% were recommended the vaccine. Sixty-four percent of students who were offered the vaccine accepted the immunization. The overall clinic vaccination rate post-implementation was 4.5%. Limitations of the project included staffing issues, problems with staff completing the education in a timely manner, providers' perceptions of time constraints, students not remembering their HPV vaccine status, and a lack of knowledge around insurance coverage for the vaccine. The vaccination of even one previously unimmunized student can slow the spread of HPV; therefore, this project affected practice and patient outcomes through implementation of an HPV vaccination program, increasing HPV vaccination rates in an at-risk population.

Keywords: human papillomavirus vaccine, human papillomavirus

Implementation of the Human Papillomavirus Vaccine Among Health Professions Students

The Human Papillomavirus (HPV) is the most widespread sexually transmitted infection in America (Centers for Disease Control and Prevention [CDC], 2017). It affects 79 million Americans every year in the form of oropharyngeal and cervical cancers as well as genital warts. HPV can also cause vulvar, vaginal, penile, or anal cancers (CDC, 2017). It is transmitted via oral, vaginal, or anal sex with another person who is harboring the virus. In many cases, infected men and women exhibit no symptoms.

The Food and Drug Administration has approved an HPV vaccine as a means of preventing HPV-related conditions. The public tends to have a limited understanding of the importance of the vaccine. Some believe the HPV vaccine is only for young women from 11 to 26 years old; however, young men within this age range can receive the vaccine as well. Some parents feel the vaccine is not necessary for their children and contend that it may encourage sexual activity; nevertheless, vaccination in childhood is intended to prevent HPV-related cancers and genital warts later in life. Some individuals believe the HPV vaccine may be harmful despite having been Food and Drug Administration approved. Thus, vaccine-related education, provider encouragement, and staff collaboration are needed to increase the rate of HPV vaccination among eligible individuals.

Statement of the Problem

HPV is the most common sexually transmitted infection. Approximately 80 million people have HPV, and 14 million are estimated to become infected with the virus each year (CDC, 2016). HPV has over 150 strains, six of which can contribute to oropharyngeal, anal, cervical, vaginal, vulvar, and penile cancers in men and women (CDC, 2016; Osazuwa-Peters et al., 2017). About 70% of sexually active individuals are infected with HPV, which has been

prominently linked with cervical cancer (Dominiak-Felden et al., 2013). The two HPV genotypes responsible for 73% of cervical cancers are strains 16 and 18 (CDC, 2016). The incidence of cervical cancer has increased in women under 50 years old. Over 300,000 women pass away from cervical cancer each year, approximately 4,000 of whom live in the United States (CDC, 2016). In addition to cervical cancer, HPV strains 6 and 11 lead to genital warts. The remaining five strains—31, 33, 45, 52, and 58—cause an additional 15% of cervical cancers (CDC, 2016).

The current recommendation is to vaccinate boys and girls ages 11 to 12 (Cohen & Legg, 2014). A Healthy People 2020 goal is to increase cervical cancer prevention, measured as 80% of eligible candidates receiving the HPV vaccination at an early age (Osazuwa-Peters et al., 2017; Ratanasiripong, Cheng, & Enriquez, 2013). However, if an individual has not received the HPV vaccine by college age, then the three-dose series should be encouraged. University clinics provide an ideal venue for administration.

Some individuals may consider university students too old to receive the vaccine, assuming it is too late for them to be vaccinated; accordingly, HPV vaccination rates are much lower in this population. The American College Health Association has stated that approximately 35% of men and 55% of women in college stated they had received at least one dose of the HPV vaccine (as cited in Vázquez-Otero et al., 2016). This finding supports low HPV vaccination rates among the college-aged population although most individuals within this age range are sexually active. For example, in one study, nearly 78% of students surveyed reported having engaged in sexual intercourse (Marchand, Glenn, & Bastani, 2012). College students are therefore at high risk of transmitting and contracting HPV (Cohen & Legg, 2014).

Government officials have not prioritized the HPV vaccine for social and political reasons. Rumors abound that the HPV vaccine will increase sexual activity and lead teens and

young adults to have more sexual partners. Many religious and social groups have therefore spurned this vaccine. Many state higher education institutions also do not have policies mandating HPV vaccination; thus, more education and awareness is needed to increase public acceptance and understanding of the importance of the HPV vaccine.

There are many reasons for low HPV vaccination completion rates among college students (Rashid, Labani, & Das, 2016). For example, many university students may not have had a chance to receive the vaccine as pediatric patients. If they were offered the vaccine, their parents may have refused the vaccination or were not provided sufficient information to make an informed decision regarding vaccination. Due to the fast pace and lack of time in clinics, healthcare providers face various obstacles to thoroughly educating patients about the HPV vaccine. At the university level, students can make their own medical decisions without parental consent (Barnard, George, Perryman, & Wolff, 2017). Therefore, better awareness and education regarding the HPV vaccine is imperative to increasing immunization rates among eligible university students (Cohen & Legg, 2014; Marchand, Glenn, & Bastani, 2012).

Background and Significance

Approximately 14 million young adults are infected with HPV annually, and nearly half the population will come into contact with HPV at some point in their lives (CDC, 2016; McCave, Chertok, Winter, & Haile, 2013). Each year, 19,200 women and 11,600 men are diagnosed with an HPV-related cancer in the United States HPV-associated oropharyngeal cancers are most common in men, with 9,100 men diagnosed in America every year (CDC, 2017). Cervical cancer is the third most common cancer caused by HPV; 12,000 women in the United States are diagnosed with it annually. Of all HPV-related diseases, cervical cancer is the most serious female condition. It is most common in women, especially those who are sexually

active (Ndikom & Ofi, 2012). Oropharyngeal cancer is the sixth most common HPV-related disease, causing 70% of cases in women and men. Prevention of these and other HPV-related conditions through administration of the HPV vaccine can potentially protect thousands of men and women (including those already infected with HPV) from serious and possibly fatal cancers.

The major HPV vaccine available to prevent cervical cancer in the United States is the 9-valent/9vHPV or Gardasil 9 vaccine (CDC, 2017). Merck manufactures Gardasil 9 (and previously the quadrivalent, Gardasil 4); GlaxoSmithKline produced Cervarix, a bivalent vaccine, until 2016. Gardasil 4 debuted in June 2006 and was initially available for young women before being approved for use in young men in October 2009; it covered HPV strains 6, 11, 16, and 18. In 2006, the National Advisory Committee on Immunization Practices in the United States recommended the vaccine for girls ages 11 to 12. The bivalent vaccine, Cervarix, was released in October 2009 for young women and covered HPV strains 16 and 18 (Dominiak-Felden et al., 2013).

These vaccines have since been replaced by Gardasil 9, which covers both sexes from 9 to 26 years of age and protects against strains 6, 11, 16, 18, 31, 33, 45, 52, and 58. Men between 22 and 26 years old are only recommended to receive the vaccination if they are immunocompromised or have homosexual partners (CDC, 2017). Gardasil 9 can prevent up to 80% of cervical cancers worldwide (CDC, 2017), and in trials for vaccine approval, it was nearly 100% effective in preventing cervical, vulvar, and vaginal diseases caused by the five additional HPV types (31, 33, 45, 52, and 58) (Chatterjee, 2014). Since the end of 2016, most clinics have begun using Gardasil 9 to vaccinate eligible individuals who consent to receive the vaccine. Contraindications for the HPV vaccine include the potential for Cervarix to cause anaphylaxis in

individuals allergic to latex, whereas the Gardasil types carry the risk of an increased reaction in individuals allergic to yeast.

HPV vaccination rates are low for many reasons, including speculation that the vaccine promotes sexual activity; thus, many parents of college students do not advocate for the vaccine prior to their children leaving home (Ratanasiripong et al., 2013). Additionally, there is a low completion rate of the three-dose series among those who have received the HPV vaccine, with minorities having a lower completion rate than other groups. African-American women have the highest death rate from cervical cancer (Galbraith et al., 2016). African-Americans are also the least educated about the HPV vaccine compared to non-Hispanic whites, who are more willing to receive the vaccine when offered (Osazuwa-Peters et al., 2017). Many minority parents mistakenly believe that their child will contract HPV from the vaccine. Another discrepancy is prevalent among college-aged women, 70% of whom report being sexually active while less than 50% have completed the three-dose HPV vaccination course at 0, 1–2, and 6 months (Ratanasiripong et al., 2013).

A lack of understanding and awareness of the devastation associated with cervical cancer has led to many problems (Marchand, Glenn, & Bastani, 2012). The first HPV vaccine was released over 10 years ago, yet many college students have not been vaccinated. Factors such as cost, insufficient access to care, and poor public awareness partially explain why individuals do not take advantage of this preventative option to protect against cervical cancer. Other individuals are nervous about receiving the vaccine due to a lack of knowledge about its benefits (Remes, Smith, Alvarado-Llano, Colley, & Levesque, 2014). The HPV vaccine requires a three-dose series and thus necessitates patient effort to ensure completion. If the series is initiated prior to age 15, only two doses are necessary, rendering earlier vaccination more efficacious. Another

issue involves informing the patient that the HPV vaccine is due, especially for the three-dose series. Notification methods, such as electronic reminders through a patient portal, have been shown to increase course completion among patients in the primary care setting (Wright et al., 2011).

Increasing the rate of HPV vaccination depends on patients' perceptions of the vaccine and associated marketing strategies. Choosing not to vaccinate will reduce the protection the HPV vaccine provides the population (Osazuwa-Peters et al., 2017; Simms et al., 2016). Thus, cervical cancer may result in higher rates of morbidity and mortality. Also, the lack of a mandate for the vaccine contributes to low HPV vaccination rates. The government can assist in increasing vaccination by requiring individuals between 9 and 26 years old who do not want the vaccine to opt out in lieu opting in for the vaccine. Opting out occurs when an individual must specifically state he or she does not want a vaccine.

Additional efforts must be devoted to marketing the HPV vaccine to promote and increase HPV vaccination rates. The incidence of HPV-related oropharyngeal and anal cancers in men is rising, but men are less aware of the HPV vaccine than women (Osazuwa-Peters et al., 2017). Not all providers routinely recommend the HPV vaccine, and many parents have stated that if a provider does not recommend that their son or daughter receive the vaccine, then they are less likely to have their child vaccinated (McRee, Gilkey, & Dempsey, 2014). Providers may not recommend the vaccine for several reasons: time constraints; difficulty advocating for sexual health, especially to parents of young children; absence of data regarding long-term side effects of the vaccine; and the fact that HPV vaccination is not mandatory. Providers also tend to recommend the vaccine to women more than men (McRee et al., 2014). Lastly, even when

providers recommend the vaccine, some parents will use avoidance strategies to circumvent their child's vaccination (e.g., stating they wish to delay the HPV vaccine to a subsequent visit).

Assessment

The location for this evidence-based project was a south-central Texas health science center university student health clinic. The university clinic provides primary care services (e.g., annual physicals, immunizations, and blood work), care for acute illnesses and minor injuries, and health promotion services to approximately 3,000 students. All students are required to carry either university-offered health insurance or another form of health coverage. Five nurse practitioner providers work varying hours in the clinic along with a registered nurse (RN), licensed vocational nurses (LVNs), and two medical assistants (MAs). The clinic is nurse-managed by a physician who serves as the delegating physician per Texas law. The clinical manager reported that the clinic engages in about 8,000 encounters annually. Eighty-four percent of patients seen in the clinic are students in their twenties, and most are women. The predominant ethnicities are Caucasian and Hispanic. Many patients who come to the clinic have their own transportation. The most common reasons for visitation are immunizations and allergies.

Although many visits are related to immunizations, a microsystem assessment conducted in Spring 2016 demonstrated that the HPV vaccine was not routinely recommended to students because the clinic did not stock the vaccine. If a student wanted the vaccine, then he or she would be instructed to go to a local pharmacy or another primary care provider who offered it. For many students, the student health clinic serves as their primary care provider while attending school; therefore, the student has two providers. Many students within the eligible age range for the HPV vaccine were also being missed because they were assumed to have received the

vaccine while living at home. Moreover, providers did not regularly address the need for the HPV vaccine during appointments, especially annual physicals. During an observed clinic day, two women were encouraged to receive the HPV vaccine because they were younger than age 26; however, men seen during the same time frame were never offered the vaccine.

The microsystem assessment also revealed that the clinic's electronic medical records system had no way to alert the provider that a student was eligible for the HPV vaccine; there was also no manual way to notify the provider of the need for the vaccine. Because the vaccine was not being regularly offered, no mechanism was in place to assist students in remembering to come for the remaining doses in the HPV series. Furthermore, even though the university is a healthcare-focused education institution, no pamphlets or information on the HPV vaccine were available either in the clinic or on the university website to increase student awareness. The availability of such materials would allow students to become educated about the vaccine and make an informed decision on whether to receive it. Lastly, at the university level, no electronic hold on a student's account prevented him or her from registering, as is customary for other immunizations, because the HPV vaccine is not mandatory.

One benchmark for the HPV vaccine in college-aged students is the American College Health Association (ACHA) guidelines. The ACHA guidelines refer to the CDC as a resource for more information, offering recommendations for immunizations within the college setting. Regarding the HPV vaccine, all women between 11 and 26 years old should be vaccinated with the bivalent, quadrivalent, or 9-valent vaccine. Men between 11 and 21 years old should receive the quadrivalent or 9-valent vaccine, as should men who have sex with other men or those who are immunocompromised and between 11 and 26 years of age (ACHA, 2017).

The HPV vaccine should be available as a three-dose series (administered at 0, 1–2, and 6 months) in the college setting for young adults who have not been vaccinated. The clinic should prioritize implementation of an HPV vaccination program because thousands of potentially eligible students may be at risk for cervical and oropharyngeal cancers as well as genital warts if they are not vaccinated against HPV. Texas has not mandated the HPV vaccine as it has for other immunizations, thereby lowering immunization rates. On February 2, 2007, then-governor Rick Perry signed an executive order that would have mandated that all girls entering the 6th grade receive the HPV vaccine; however, the Texas governor reversed his stance shortly thereafter amid criticism from conservative Texans.

Organization Readiness for Change and Stakeholder Engagement

Upon review of the ACHA guidelines and the results of a Spring 2016 microsystem assessment, it was determined that the stakeholders in the organization were ready for change. Numerous talks with the clinical manager and the Dean of the School of Nursing indicated that both advocated for offering the HPV vaccine at the student health clinic. All parties agreed that providing the vaccine would be imperative to primary care provided at the university student health clinic. By offering the HPV vaccine, students could obtain the three necessary doses. The clinical manager supported stocking the clinic with the HPV vaccine and implementing a marketing campaign to spread awareness about it. All providers and staff expressed their support of the plan to begin to vaccinate individuals who consented to receive the HPV vaccine. Policy-making was also part of the plan and was conducted in collaboration with a panel of individuals integral to the launching of the HPV vaccination program in the student health clinic.

In summary, there was an identified deficit in the student health clinic regarding the prevention of HPV-related illnesses due to the on-site unavailability of the HPV vaccine.

Documentation presented another problem: students who had received the HPV vaccine were not labeled as such through their student records, and those who had not received the vaccine were not identified and could number in the thousands. Many students younger than 26 years who were eligible to receive the vaccine could not receive it in the student clinic. Although students could visit a local pharmacy to receive the vaccine along with corresponding documentation in their school vaccination record, this process was inconvenient and seldom offered. Health insurance (whether school-provided or private) covers preventative vaccines, including the HPV vaccine. Thus, the cost of the vaccine was not a barrier to program implementation because the clinic would bill most insurance companies.

Project Identification

Purpose

The purpose of this evidence-based project was to implement an HPV vaccination program at a health science center university student health clinic to increase vaccination rates to meet the guidelines of ACHA and the CDC. The project represents a primary care initiative to prevent future HPV-related diseases such as cervical and oropharyngeal cancers.

Objectives

The objectives of this project were as follows:

1. One hundred percent of providers and staff would be educated on the importance of the HPV vaccine and the new HPV vaccination program in the clinic.
2. Provider recommendations for the HPV vaccine to eligible students would increase from 0% initially to 50% post-implementation.
3. The number of eligible students offered the HPV vaccine who received a dose would increase from 0% initially to 50% post-intervention.

4. The HPV vaccination rate among eligible students who visited the student health clinic would increase from 0% initially to 60% post-intervention.

Anticipated Outcomes

The anticipated short-term outcome for this project was an increased HPV vaccination rate among students attending the university, increased awareness and education around the HPV vaccine among students at the university, and an increase in recommendations by providers, with staff collaboration, for the HPV vaccine to eligible students. In addition, upon completion of the implementation period, the clinic would align with Healthy People 2020 goals and the ACHA and CDC guidelines. The anticipated long-term outcome was the prevention of HPV-related diseases, thereby decreasing morbidity and mortality.

Summary and Strength of the Evidence

Extensive research has addressed implementing the HPV vaccine in various environments. Studies have demonstrated which methods were successful and where improvements were needed. Data from these studies are summarized herein. Lander, Besson, Rodrigues, Audureau, and Saba (2014) reported that implementing the HPV vaccine in low-income countries using a no-cost method was highly effective. However, vaccination rates were better when supply was uninterrupted; a consistent supply eliminated delays in administering the vaccine (Ladner, Besson, Rodrigues, Audureau, & Saba, 2014). Thus, having the logistics in place to ensure the student clinic had a consistent vaccine supply was important. Ladner et al. (2014) also suggested that the best way to increase HPV vaccination rates was to establish a school-based vaccination program where students could receive each of the three required doses on campus (Ladner et al., 2014).

Many factors contribute to a college student's willingness to begin and complete the HPV vaccine series. Marchand, Glenn, and Bastani (2012) found that among 178 community college female students in Los Angeles, 43% demonstrated a three-dose completion rate, with students who were studying a health-related major or were younger being more likely to start the vaccine series. Another study examining the behaviors of Hispanic college women revealed that if a student was obese and had not received the flu vaccine or scheduled a Pap smear in the past 12 months, she was less likely to receive the HPV vaccine (Cohen & Legg, 2014).

Alexander et al. (2014) investigated how best to encourage awareness and increase vaccination rates among teen men. The authors suggested that awareness should focus on how HPV is transmissible between partners. Emphasizing the negative consequences of not receiving the vaccine was found to be more effective than stating the usual positive remarks about the vaccine (Alexander et al., 2014). Lastly, Dominiak-Felden et al. (2013) stated that HPV vaccination rates would increase if the message focused on the fact that the HPV vaccine prevents genital warts and anal, oral, and penile cancers. Thus, messaging to develop awareness should focus on the lack of life quality when a person is diagnosed with HPV-related lesions or neoplasms (Dominiak-Felden et al., 2013).

Many researchers have concurred that completion of the three-dose series is low compared to the already low initiation rate among the eligible population (Alexander et al., 2014). When the HPV vaccine was encouraged along with screenings for other sexually-transmitted diseases like HIV, the vaccination completion rate increased (McCave et al., 2013). Electronic reminders via a healthcare portal or similar system, at an interval that does not overwhelm patients, has also been shown to promote vaccination completion (Wright et al., 2011).

Between-group comparisons have revealed differences in HPV vaccination rates. Disparities persist among minority populations and Caucasians in terms of receiving and being aware of the HPV vaccination (Marchand et al., 2012; Osazuwa-Peters et al., 2017). The Caucasian population was also more likely to receive and complete the HPV vaccination course than their minority counterparts (Ratanasiripong et al., 2013). Regarding other demographics, men are less likely to be vaccinated against HPV than women (McCave et al., 2013). Younger eligible patients are more likely to receive the vaccine than those who are older, as the latter group may believe it is too late to be vaccinated. Thus, promotional efforts should target individuals who are older, low-income, minority, or male to increase vaccination rates among the eligible population.

Methods

Project Intervention

Steps of the HPV vaccine implementation plan are outlined in Figure 1.

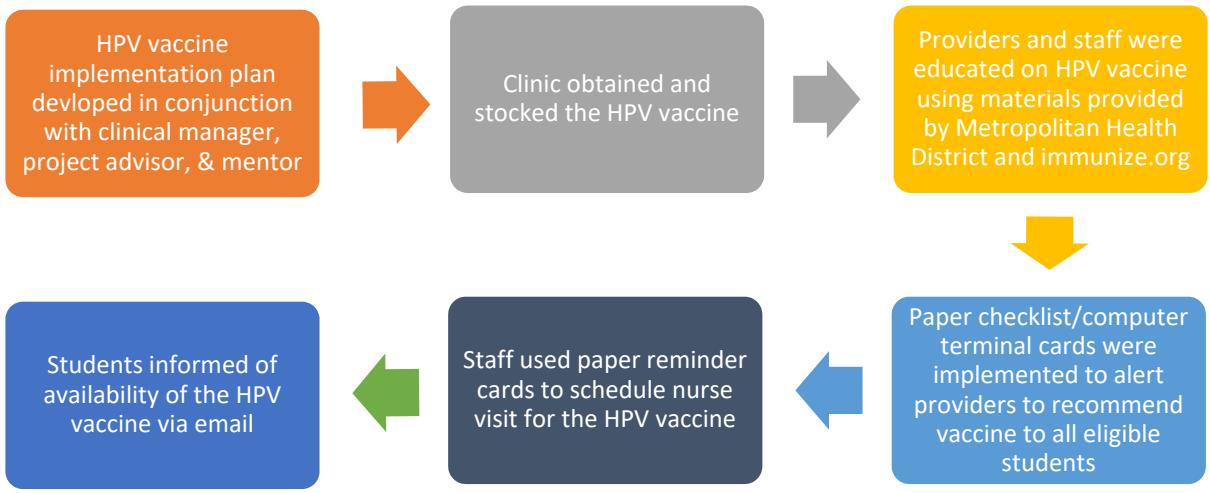
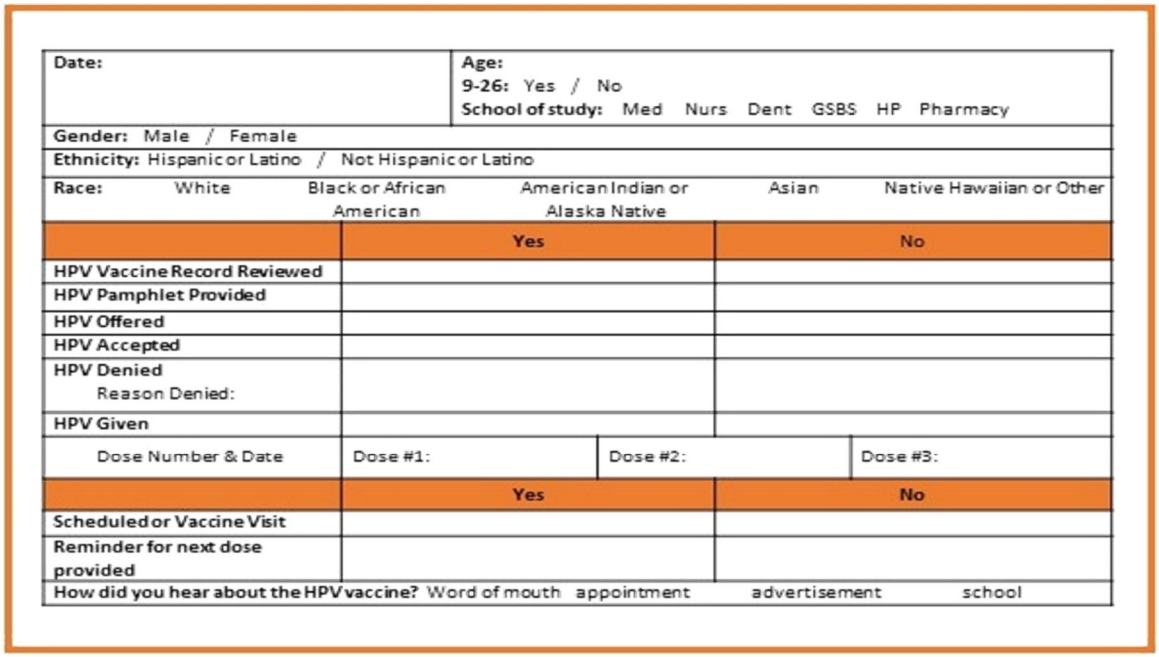


Figure 1. Implementation plan.

The vaccination process in the implementation plan was initiated either when an eligible student requested or a provider offered the HPV vaccine to patients from 18 to 27 years old. Although the eligible age criteria for receiving the HPV vaccine at the time of this study was 9 to 26 years old, 27-year-old students were considered candidates in the case at least one dose had been received before age 26 and the series needed to be completed. Next, the provider and student discussed the HPV vaccine to determine eligibility. If the student was eligible but declined the vaccine despite provider-based education, the reason for refusal was documented in the student's electronic health record. If the student agreed to be vaccinated, he or she then signed a consent form indicating an understanding of the risks and benefits of the HPV vaccine. The student was also given a Vaccine Information Sheet. After the RN or LVN administered the HPV vaccine, the front desk staff or MA scheduled the student for a nurse visit to receive the next HPV vaccine dose; a wallet-size reminder card (see Figure 2) was provided to remind the student about his or her next HPV vaccination nurse visit.

Figure 2. Wallet-size reminder.

The HPV vaccine implementation plan was based on the Plan, Do, Check, and Act cycle. A new component of the intervention was introduced every other week to increase the HPV vaccination rate among university health professions students. Week 1 included staff education on the HPV checklist (see Figure 3). Week 2 reinforced the previous week. Week 3 reminders using the CDC advertising marketing campaign were posted on computer terminals in an area visible to providers. Week 4 provided reinforcement of the posted reminders on clinic computer terminals (see Figure 4). In Week 5, students in the clinic waiting room were offered an immunize.org flyer as a handout; the flyer was also used as an email marketing tool, distributed to all university health professions students, to encourage students to receive the vaccine. Weeks 6 through 8 focused on reinforcement of all intervention components.



Date:	**Age:** **9-26:** Yes / No **School of study:** Med Nurs Dent GSBS HP Pharmacy		
Gender: Male / Female			
Ethnicity: Hispanic or Latino / Not Hispanic or Latino			
Race: White Black or African American American Indian or Alaska Native Asian Native Hawaiian or Other			
	Yes	**No**	
HPV Vaccine Record Reviewed			
HPV Pamphlet Provided			
HPV Offered			
HPV Accepted			
HPV Denied Reason Denied:			
HPV Given			
Dose Number & Date	Dose #1:	Dose #2:	Dose #3:
	Yes	**No**	
Scheduled or Vaccine Visit			
Reminder for next dose provided			
How did you hear about the HPV vaccine? Word of mouth appointment advertisement school			

Figure 3. HPV checklist.

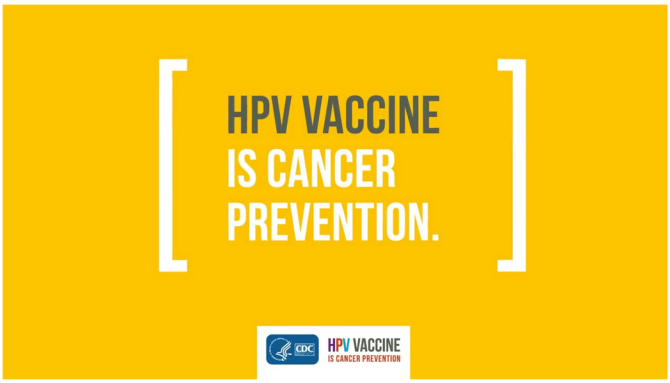


Figure 4. Computer terminal reminder.

During every week of the HPV vaccine implementation period, the DNP student performed an audit of providers' patient loads to identify students eligible for the vaccine. Each provider was then assessed to determine the percentage of students offered and subsequently given the HPV vaccine. If a provider had not completed the HPV checklists or initiated the conversation with eligible students, then the graduate student spoke with the provider to determine the reasons for not offering the HPV vaccine and discuss a plan for improvement.

Organizational Barriers and Facilitators

The primary barrier was that the HPV vaccine is not included in the requirements for university attendance. Additionally, clinical rotations do not ask for it, providing no impetus for the clinic to enforce the HPV vaccine. The university does not track the HPV vaccine in student records or the student clinic, and assessments for the HPV vaccine are not routinely completed. Moreover, men are almost never offered the vaccine although HPV occurs in men; this practice does not correlate with the ACHA guidelines, which represent the benchmark to which university student health clinics are held. The ACHA guidelines refer to the CDC guidelines as a resource regarding which immunizations should be administered within the college setting. As for organizational facilitators, the clinical manager and the Dean for Practice & Engagement

supported the provision of the HPV vaccine. Stakeholders understood the importance of the vaccine and wished to comply with the ACHA guidelines; thus, they were eager to promote HPV vaccine implementation.

Ethical Considerations

An ethical issue identified in the literature was the belief that the vaccine would cause individuals to be sexually active (CDC, 2016). Furthermore, vaccination does not prevent other sexually transmitted infections, as the HPV vaccine does not protect against sexually transmitted diseases; thus, additional protection through condom use should be encouraged. Staff and student education are therefore imperative to dispelling biased and non-evidence-based beliefs.

Results

Objective 1: One hundred percent of providers and staff would be educated on the importance of the HPV vaccine and the new vaccination program. [Goal met.]

All providers and staff completed the HPV PowerPoint education and the pre- and post-tests (see Appendix A). Staff scores improved by 33% from pre- to post-test; however, barriers were encountered. A Health Department representative was originally scheduled to present the PowerPoint to the staff with, but many staff were occupied with patients and not enough were available at the time of the presentation. Then, a PowerPoint voiceover link was provided as an alternative to the live presentation, but no staff took advantage of this mode of presentation. Lastly, a paper copy of the PowerPoint was provided to the staff. The staff still stated they were too busy to complete the PowerPoint education and post-test; education completion was hence delayed.

Objective 2: Provider recommendations for the HPV vaccine to eligible students would increase from 0% initially to 50% post-implementation. [Goal not met.]

Of 205 student visits during the implementation period, providers offered 10.7% of students the vaccine (see Figure 5). All student visits were included; therefore, students who may have completed the series prior to matriculating into the university were included in the total.

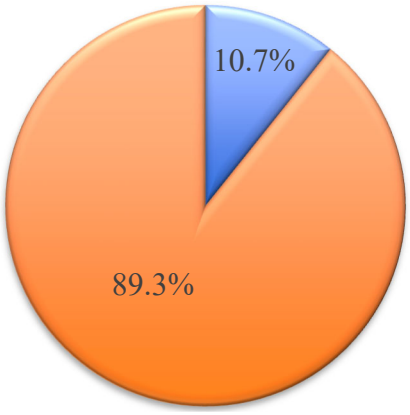


Figure 5. Percentage of provider HPV vaccine recommendations ($N = 205$).

Objective 3: The number of eligible students offered the HPV vaccine who received a dose would increase from 0% initially to 50% post-intervention. [Goal met.]

Sixty-four percent of eligible students who were offered the HPV vaccine received the immunization (see Figure 6). Students who had completed the HPV series prior to matriculating were not included in the total because they were not considered eligible for the vaccine at the time of their visit.

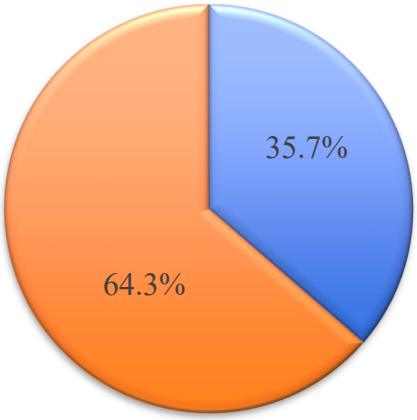


Figure 6. Percentage of eligible students receiving the HPV vaccine ($n = 22$).

Objective 4: HPV vaccination rates among eligible students who visited the student health clinic would increase from 0% initially to 60% post-intervention. [Goal not met.]

The overall clinic vaccination rate post-implementation was 4.5% (n = 197), assuming that all 197 students not offered the HPV vaccine were eligible for it and had not completed the HPV series prior to matriculating.

Discussion

Taking the above objectives as an outline for the HPV implementation project in the student health clinic, each objective will be discussed in detail.

Objective 1

The main objective was to increase awareness of the HPV vaccine and the new HPV vaccination program. A major component of the corresponding education was to emphasize that both sexes can receive the vaccine as a preventative measure for genital warts as well as oropharyngeal, anal, and cervical cancers. Ages for eligibility were also reviewed. The desired outcome was to educate 100% of clinic providers and staff. This objective was measured by comparing knowledge before the presentation to knowledge gained post-presentation intervention by conducting a pre- and post-test. The pre- and post-test instrument was reliable and valid according to city health department personnel.

The objective for this part of the HPV project was met, representing an important milestone in the project. All providers and staff increased their knowledge of the HPV vaccine and the new program. Therefore, the PowerPoint presentation was useful in providing staff meaningful knowledge about the implementation of the HPV vaccine. Challenges in implementing this part of the intervention included a lag time in completing the education component, which delayed the project start. The scheduled date on which city health department

personnel came to perform a presentation at the clinic was not a practical use of time, per the clinical manager, and not all staff members could attend the meeting at the same time. The scheduled presentation was canceled due to poor attendance. Time constraints in the clinic rendered it difficult for staff to complete a 20-minute voiceover presentation. Staff also stated they were too busy to complete the pre-test and post-test; thus, they were encouraged to increase completion. Whole-staff completion of the education component of the HPV intervention project was time-consuming.

Objective 2

Another main objective was to increase the rate at which clinic providers offered the HPV vaccine to eligible students, increasing from a pre-intervention rate of 0% to 50% by completion of the project. The method of measurement was to assess the number of total appointments compared to information collected on the HPV checklists completed by providers each week. This objective was not met due to many missed opportunities by providers to recommend the HPV vaccine to eligible students. Providers stated they did not remember to encourage eligible students to receive the vaccine. Other difficulties included a lack of pop-up reminders in the electronic medical record system. Also, providers did not feel that recommending the HPV vaccine was the main priority for patients who were being seen for a different reason.

Some successes included the staff being able to follow the processes of providing students with HPV-related education and having them sign the consent form. Once students signed the consent form, then the RN or LVN administered the HPV vaccine. Finally, students were given a reminder card to place in their wallet after the MA scheduled their next visit.

Objective 3

The next objective was to increase the vaccination rate among eligible students who were offered the vaccine from 0% to 50%. This objective was met. A success and strength of the HPV vaccination project involved adult students' ability to make an informed decision about whether to receive the HPV vaccine based on recommendations and education from the provider. Challenges included that some students did not know if they had received the HPV vaccination previously or how many doses they had received. Many university students stated they would need to check their immunization records to determine if they needed the HPV vaccine. Other students were not interested in receiving the vaccine despite efforts to educate them on its importance. Some students stated they were dose-complete.

Objective 4

The final objective was to increase the overall HPV vaccination rate among eligible students by 60% post-intervention. In the interest of time, the focus was on the first-dose initiation. This objective was measured by documenting how many people received at least one dose of the HPV vaccine during the implementation period. This objective was not met. Difficulties included providers not acknowledging the importance of offering the HPV vaccine. They felt they did not have enough time to address each eligible student's chief complaint and recommend the HPV vaccine. In addition, despite an extensive HPV vaccination marketing campaign, the effects of such advertising were minimal.

Limitations

An education-related limitation during the first part of the HPV project emerged when the initial mode of presenting education to providers and staff was ineffective, resulting in varied education attempts. First, a presentation with a health department representative was scheduled

but was not attended. Many providers worked on different days, making it difficult to find a time that accommodated their busy schedules. Thus, an audio accompaniment was offered to staff as an independent alternative; however, staff reported issues accessing the audio PowerPoint, which increased the lag time for education completion among providers and staff. The last option was a printed PowerPoint for the staff to read. Providers and staff needed time to complete the pre-test, education, and post-test. Many reminders from the DNP student and a staff luncheon were offered before all providers and staff completed education and testing.

Additional limitations included providers not prioritizing offering the HPV vaccine to eligible students. Although providers understood evidence-based research and that the vaccine was part of the ACHA guidelines, they felt that the student's chief complaint was the primary purpose for the visit, and telling the student about the HPV vaccine took time away from the presenting problem. Another problem was that the clinic continued to run out of stock of the HPV vaccine during the implementation period. Lastly, students could not remember their HPV vaccination status and thus had to decline the HPV vaccine when it was offered. Finally, the reimbursement process when offering the HPV vaccine to university students needed to be clarified. The clinic did not receive full reimbursement for the vaccine, likely due to entering the wrong code when billing insurance companies.

Recommendations

Recommendations for the education component of the HPV vaccine implementation program are to keep it simple for staff to complete. A paper copy of the PowerPoint would be an ideal way to disseminate information among staff to be read at their convenience. More research is needed regarding motivating staff to complete educational offerings; flexibility and patience

appear to be key in this regard. Additionally, the CDC website and local public health department should help providers remain abreast of the most up-to-date information.

Some suggestions to increase the rate of recommending the HPV vaccine to eligible students include incorporating HPV vaccine eligibility and assessment into the electronic medical record. This strategy will allow standardization of an assessment for required and recommended student vaccinations. Another way to increase the vaccination rate among eligible students includes encouragement by the clinical manager to enforce this policy among providers in the student health clinic. Lastly, the addition of a reimbursement plan or a benefits coordinator would facilitate higher HPV vaccination rates.

Implications for Practice

The providers at the university clinic are aware of the consequences of not following evidence-based guidelines when it comes to the primary care of health professions students. Enlightening providers and staff about this aspect of care could potentially decrease morbidity and mortality among the university student population. An additional implication is financial; this HPV project included insurance reimbursement and ensuring the clinic received funds for administration of the HPV vaccine. Lastly, in terms of a provider-focused initiative, university students may be more likely to consent to receive the HPV vaccine, if their primary care provider recommends it.

For this project, the DNP-prepared nurse practitioner student applied evidence-based scientific knowledge to the healthcare setting (Essential I). Inter-professional cooperation was required for a collaborative project such as this; the DNP student worked with MAs, LVNs, RNs, and providers (Essential VI). The project coordinator recognized gaps and missed opportunities in the healthcare system and arranged a process improvement plan to address these deficits,

reinforcing that DNPs are in a position to lead change for the better (Essential II). Using weekly audits as a means of collecting and tracking data is reflective of the ways in which a DNP-prepared nurse can harness healthcare information technology to improve healthcare (Essential IV). The university student clinic had never had an HPV vaccination program; launching one required policy development and modifications to clinical decision making and related processes (Essential V). Overall, increasing the HPV vaccination rate is expected to lead to positive long-term outcomes, such as increasing students' protection against HPV and its subsequent morbidities.

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Appendix A

Education Pre- and Post-Test

HPV Education Test

Provider/Clinic Name: _____ TVFC _____

What is your current role or title with this practice? (Circle all that apply)

Primary TVFC Contact Secondary TVFC Contact Clinic or Office Manager

Patient Care Staff (Physician, Nurse, PA, MA) Front Desk Staff/Administrative/Billing Staff

Please circle true or false for the questions below.
If you are unsure please circle "Not Sure". Thus will help us better understand the areas that need

True	**False**	**Not Sure:**	**HPV can affect anyone of any age?**
True	**False**	**Not Sure:**	**The HPV vaccince is not light sensitive and can be kept close to the light?**
True	**False**	**Not Sure:**	**The HPV vaccine is only a 3 does series?**
True	**False**	**Not Sure:**	**The purpose of the HPV vaccine is to help prevent certain types of cancer?**
True	**False**	**Not Sure:**	**Only girls need to receive the HPV vaccine?**
True	**False**	**Not Sure:**	**HPV cannot be passsed by skin-to-skin contact?**
True	**False**	**Not Sure:**	**The HPV vaccine is a live antigen?**