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HPV Vaccination in Adults 18 Through 45: Reducing Missed Vaccination Opportunities in the Primary Care Setting

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HPV VACCINATION IN ADULTS 18 THROUGH 45: REDUCING MISSED VACCINATION OPPORTUNITIES IN THE PRIMARY CARE SETTING

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Abstract

Human papillomavirus (HPV) is the most prevalent sexually transmitted infection in the United States and is linked to six different types of cancer cell development. Prevention of infection from this virus could save hundreds of thousands of lives worldwide. An evidence-based quality improvement project was designed to increase the identification of HPV vaccination opportunities in the adult primary care setting to improve HPV vaccination rates. A protocol and patient eligibility algorithm were developed to align primary care practice with recently updated CDC guidelines. Interventions included clinic staff and provider education, designation of a vaccination champion, a flag within the patient chart to alert the provider, the use of a strong provider recommendation, and patient education through handouts, posters, and provider instruction. Response to COVID-19 pandemic required the project leader to restructure interventions, which effectively sustained the project with improved outcomes. Providers identified vaccination opportunities in 100 of the 184 patients 18 through 45 years of age, improving rate of identified vaccination opportunities from 0% to 54.3% during the 41 days of active implementation. There was a statistically significant relationship ($p < .000$) between a strong provider recommendation and the patient's willingness to start or complete their HPV vaccination. Identifying HPV vaccination opportunities in adults aged 18 through 45 years in the primary care setting improves patient's quality of health through promotion of health and cancer prevention. Future clinics should consider the value of DNP prepared NPs being experts in implementing evidence-based practice.

Keywords: human papilloma virus, vaccination, HPV, cervical cancer, oropharynx cancer

HPV Vaccination in Adults 18 Through 45: Reducing Missed Vaccination Opportunities in the Primary Care Setting

Prevention of illness and disease is a worldwide public health concern. Mortality causes are tracked and researchers focus on high causes of mortality with a goal to find a preventive solution. Human papillomavirus (HPV), a virus transmitted through sexual contact, is estimated to have infected 79 million individuals in the United States (Johnson-Mallard et al., 2019). HPV can cause the development of genital warts and precancerous cells (cervical intraepithelial neoplasia grade 2+ [CIN2+]), which can develop into cervical cancer (Drolet et al., 2019). There have been 15 identified HPV strains, out of 200, linked to cancer cell development (Staples & Duska, 2019). Cancers caused by HPV include penile, anal, and oropharynx cancers in men and cervical, vaginal, vulvar, anal, and oropharynx cancers in women (Centers for Disease Control and Prevention [CDC], 2019a). The CDC (2019b) estimates 91% of cervical cancers in the United States are caused by HPV. Cervical cancer is estimated to claim the lives of more than 300,000 women worldwide each year (World Health Organization, 2019). Prevention of infection from this virus could save hundreds of thousands of lives worldwide.

In 2006, the first HPV preventive vaccine, Gardasil (4vHPV), was made available in the United States. This quadrivalent vaccine provides protection from four high-risk strains of HPV: 6, 11, 16, and 18 (Staples & Duska, 2019). Located within the U.S. Department of Health & Human Services, the U.S. Food and Drug Administration (FDA) originally approved the vaccine for females between the ages of 9 and 26 years for the prevention of cervical cancer (Staples & Duska, 2019). Research efforts shifted to include men after HPV was linked to penile and anal cancer (Daley et al., 2017). In 2011, scheduled HPV vaccination was recommended in males between the ages of nine and 21, with high risk males eligible for vaccination through age

26 (Daley et al., 2017). In 2014, the vaccine Gardasil 9 (9vHPV), replaced the quadrivalent vaccine in the United States. This nonavalent vaccine included protection against five additional high-risk HPV strains: 31, 33, 45, 52, and 58 (Staples & Duska, 2019).

Statement of the Problem

The CDC (2019a) states that the HPV vaccine prevents 90% of related cancers. In 2018, with the support of literature from around the world, the FDA (2018) approved the 9vHPV vaccine for women and men aged 27 through 45 years, expanding the eligible age range for males and females from age 9 through 26 years to age 9 through 45 years. In 2019, the CDC Advisory Committee on Immunization Practices (ACIP) endorsed routine 9vHPV catch-up vaccination series for adult men and women through the age of 26 years (Meites et al., 2019).

In 2019, the ACIP committee considered the benefits of vaccinating men and women ages 27 through 45 years after the FDA's expanded vaccination approval. The ACIP committee determined that vaccination of men and women 27 through 45 years old should be recommended if under-vaccinated, risk of new HPV infection, and there is mutually agreed benefit of vaccination between patient and provider (CDC, 2019c). Routine vaccination was not endorsed within this age group based on the absence of a 9vHPV vaccine placebo-controlled randomized study in the United States and lack of research on male subjects (CDC, 2019c). Upon publication of the Morbidity and Mortality Weekly Report with the accepted ACIP recommendations, the CDC guidelines were updated to align with the ACIP recommendations (Meites et al., 2019).

In 2017, only 48.6% of Americans aged 13 through 17 years had completed the HPV vaccine series (Walker et al., 2018). This left a large percentage of adolescents entering adult primary care under-vaccinated. HPV vaccination in under-vaccinated male and female adults may be routinely missed in adult primary care (Johnson-Mallard et al., 2019). With the recent

change in the 9vHPV vaccination recommendations by the FDA and CDC, there is an excellent opportunity to align current practices with updated guidelines.

The HPV vaccine has been shown to be a safe intervention with tremendous efficacy and immunogenicity in the prevention of genital warts, precancerous cells, and cancers caused by HPV (Jia et al., 2019). Clinicians must advocate for the successful completion of the 9vHPV vaccination series in appropriate patient populations to provide widespread protection in communities from high-risk HPV strains. Widespread 9vHPV vaccination coverage is a cost-effective public health intervention through reduction in the HPV infections (CDC, 2019c).

Assessment

In the primary care setting, providers are responsible for the maintenance of the patient's health (Rakel & Rakel, 2016). Primary care providers are pivotal members of the health care community managing chronic diseases, treating acute illnesses, and providing preventive care (Rakel & Rakel, 2016). As healthcare moves from quantity to quality, primary care has a large impact on the successful transition to improved patient and population health (Mutter et al., 2018).

Clinic Assessment

The estimated population in the zip code where the clinic is located is 47,700 residents. The majority of the residents have a high school degree or higher (90.3%) and a median income per household estimated at $56,000, which is lower than the national median income of $63,000 reported in 2018 (United States Census Bureau, 2019). Approximately 11.6% of the population live below poverty level, compared to the national poverty level of 11.8% (United States Census Bureau, 2019). The majority of residents are White (78.8%, $N = 37,596$) and Hispanic (45%, $N = 21,449$) (United States Census Bureau, 2017).

The clinic is staffed with two providers, a primary care physician and a family nurse practitioner, and eight support staff. The office manager completes patient referrals, orders supplies, and manages clinic finances. The front desk is staffed by one full-time employee to manage all front desk administrative needs. There are three medical assistants (MA) on staff who assist the providers. One of the MAs also works as the clinic's x-ray technician, providing patients the additional benefit of onsite x-rays at the clinic. A licensed lab technician staffs the clinic's onsite lab. There is one employee on staff who oversees medical records and the human resources department. Lastly, there are two employees who work in the clinic's billing department.

Prior to this project, HPV vaccination history was not addressed by providers during patient visits. There was not a process in place to identify HPV vaccination opportunities, no patient HPV education was provided, and a strong provider recommendation for eligible patient vaccination for HPV did not occur. It was decided that a quality improvement project was needed to create a new clinical process which identified eligible patients for HPV vaccination, provided patient education on benefits of vaccination, and facilitated an opportunity for the provider to offer eligible patients a strong recommendation to receive the HPV vaccine.

A pre-intervention chart audit established a baseline of the clinic's performance on HPV testing and vaccination rate from January 1, 2019 through February 1, 2019. There were 929 patient visits in the age group of 18 through 45 years old, with the majority being female (n = 627, 67.5%) and their race/ethnicity not indicated (n = 586, 63.1%). There were no HPV screening tests ordered in this time frame (Table 1).

Table 1

Patient Demographics

Demographic		*n*	%
Age			
	18 through 45	929	
	18 through 26	125	13.5
	27 through 45	804	86.5
Gender			
	Male	302	32.5
	Female	627	67.5
Race			
	White	333	35.8
	African American	10	1.1
	Not Indicated	586	63.1

Organization's Readiness for Change

After completing the systems assessment, reviewing the literature, and meeting with clinic leadership and staff, it was determined that a process was needed to identify missed 9vHPV vaccination opportunities in male and female patients between the ages of 18 through 45. Clinic staff voiced willingness to commit to process changes in support of the proposed project. The physician and nurse practitioner (NP) both expressed support of the project and the NP agreed to serve as the project champion.

Project Identification

Purpose

The purpose of this project was to provide up-to-date, evidence-based preventive care to eligible adult patients inclusive of care reflecting the most recent evidence regarding HPV preventive vaccination. The care provided was designed to reflect the recently expanded

recommendations by the FDA (U.S. Food and Drug Administration, 2018) and the CDC's ACIP (CDC, 2019c) committee for HPV preventive vaccination (Table 2).

Table 2

CDC HPV Vaccination Recommendations for Adults Aged 18 Through 45 Years

Years of Age	Recommendation	Dosing Schedule
18 through 26	Routine catch-up vaccination plan for inadequately vaccinated patients. No pretesting required Contraindicated in patients with HPV vaccine allergy, pregnancy, and/or breastfeeding	3-dose schedule 1st dose 2nd dose 1-2 months after 1st dose 3rd dose minimum 6 months after 1st dose
27 through 45	Shared clinical decision making for patients who are inadequately vaccinated and have a risk of HPV infection No pretesting required Contraindicated in patients with HPV vaccine allergy, pregnancy, and/or breastfeeding	3-dose schedule 1st dose 2nd dose 1-2 months after 1st dose 3rd dose minimum 6 months after 1st dose
>45	Not recommended	

Project Goals

The vision of this project is to improve HPV vaccination rates in eligible adult patient populations through identification of missed vaccination opportunities, thereby decreasing the population's risk of future disease caused by HPV. Six major goals are required in this evidence-based quality improvement project.

Goal 1: Educate providers, MAs, and clinic staff on HPV to promote positive responses to HPV vaccination as evidenced by 100% attendance at HPV education session.

Goal 2: Increase patient education from 0% to 80% through patient handouts, passive education, and provider/MA communication of vaccine benefits.

Goal 3: Increase identified vaccination opportunities in patients aged 18 through 45 years from 0% to 80% using updated CDC guidelines to recognize eligible patients.

Goal 4: Increase initiation of a catch-up vaccination plan for male and female patients, aged 18 through 26 years, who are not sufficiently vaccinated from 0% to 80%.

Goal 5: Increase provider initiated shared clinical decision making for male and female patients, aged 27 through 45 years to determine the benefit of vaccination, from 0% to 80%.

Goal 6: Increase the number of patients for whom HPV vaccination is prescribed from 0% to 25%.

Summary and Strength of the Evidence

A literature search was completed to evaluate the benefits, efficacy, safety, and immunogenicity of HPV vaccination in females and males aged 9 through 45 years. Peer-reviewed articles published within the last 5 years and landmark studies were included in the literature review. Additionally, current statistical data regarding vaccination rates and recommendations in the United States and globally were gathered using government agencies.

Human Papillomavirus

HPV is a sexually transmitted infection and the majority of sexually active people are exposed to the infection within 5 to 10 years of becoming sexually active (Johnson-Mallard et al., 2019; Munoz et al., 2009). Vaccination with the 9vHPV vaccine is effective in protection against HPV infection for 90% of HPV-related cervical cancers and against nine high-risk HPV

strains linked to the development of HPV-related cancer (Elliot, 2015). HPV-related cancers include cervical, oropharyngeal, anal, penile, vaginal, and vulvar (National Cancer Institute, 2020).

Healthy People 2020 (U.S. Department of Health and Human Services, Office of Disease Prevention and Health Promotion, 2019) established a goal to have 80% of males and females aged 13 through 15 successfully complete the 2-dose or 3-dose HPV vaccination series in the United States by 2020. As of 2016, 45.1% of females and 36.4% of males had completed the vaccination series in the United States (ODPHP, 2019). Walker et al. (2019) reported data indicating 51.1% of adolescents age 13 through 17 in the United States had completed the HPV vaccination series in 2018, a 2.5% increase from 2017 when 48.6% of adolescents in this age range had completed the series (Walker et al., 2018). Interestingly, the growth was due to increased vaccination rates in males (Walker et al., 2019). In 2016 the completed HPV vaccine series rate in Texas adolescents 13 through 17 years old was 32.9% (Walker et al., 2017). In 2017, this rate significantly improved to 39.7% ($p < .05$) (Walker et al, 2018). Based on reported vaccination rates in the United States, it can be estimated that more than 48% of adolescents transitioning to adult primary care have not completed the HPV vaccine series, and in Texas, that percentage increases to an estimated 60% of young adults (Walker et al., 2018; Walker et al., 2019).

Improving Vaccination Rates

Despite vaccine campaign efforts, vaccination rates remain low. In an effort to promote enhanced provider education, the CDC (2018) provides online resources for improving vaccination rates, including support for the use of a strong provider recommendation, resources for increasing provider knowledge of vaccine benefits, and suggestions for improved office practices such as obtaining vaccination records prior to a patient's visit.

A pilot study was completed in New York involving five pediatric clinics to determine which HPV vaccine interventions led to higher HPV vaccination rates (Lollier et al., 2018). The clinics were each sent a survey to complete regarding vaccination interventions. To determine clinic eligibility, a review of the New York State Immunization Information System (NYSIIS) was completed. Of the five clinics involved in the study, three had high rates of HPV vaccination and two had low rates (Lollier et al., 2018). Clinics with the highest vaccination rates used interventions of identifying a vaccination champion, conducting pre-visit chart audit, and standing orders for vaccination ($p = .002$) (Lollier et al., 2018). Higher performing clinics also had more providers ($p = .043$) and nursing staff ($p = .043$), which supported a larger patient population ($p = .043$) than smaller clinics, which may have led to higher vaccination rates (Lollier et al., 2018). These clinics entered vaccination data into the database within 2 weeks ($p = .025$) compared to the lower performing clinics that averaged data entry once a month (Lollier et al., 2018).

Providing quality healthcare begins with building a strong foundation using the Institute for Healthcare Improvement's Quadruple Aim (Mutter et al., 2018). The four pillars of the Quadruple Aim include improving health in populations and individual patients; providing comprehensive care by applying each of the four pillars in a primary care setting; using collected patient metrics to improve quality as opposed to determining quality; and developing therapeutic relationships between patients and providers (Mutter et al., 2018).

The 4 Pillars of Practice Transformation has been a successful intervention to increase vaccination rates. The 4 Pillars Practice Transformation Program for improvement of vaccination specifically includes access and convenience of vaccine, effective communication, improvement of clinic vaccination process, and clinic's staff motivation for change (Hawk et al., 2017). A

randomized study involving 25 primary care clinics improved influenza vaccination rates by implementing the 4 Pillars Practice Transformation Program, increasing provider knowledge, and designating an immunization champion who facilitated project implementation in each clinic (Lin et al., 2016). Data collected for 2 years demonstrated the most significant increase in vaccination rates stemming from decreasing missed vaccination opportunities through implementation of the 4 Pillars Practice Transformation Program interventions ($p < .005$) (Lin et al., 2016). Common barriers identified in a separate study support the use of the 4 Pillar Practice Transformation Program. Barriers reduced by the 4 Pillars Program included inconsistent staff, lack of reminder prompts, and time constraints (Rand et al., 2018). Prompts were not effective if not specific to the HPV vaccine (Rand et al., 2018).

A multistate study analyzed survey results ($n = 86$) and data from focus groups ($n = 36$) which identified effective motivators for HPV vaccination to include provider recommendation (53.5%) and patient education (51.2%), with the majority of participants (70.9%) preferring vaccination in doctor's offices (Warner et al., 2017). Barriers to vaccination included low HPV vaccine knowledge (55.8%), relating vaccine to sexual activity and disease rather than cancer prevention (44.2%), and absence of a strong provider recommendation (29.1%) (Warner et al., 2017). The National Foundation for Infectious Diseases (2014) issued a call to action for providers to increase HPV vaccination rates through a strong provider recommendation, provider education, clinic staff involvement in encouraging HPV vaccination, communication to patients about the benefits of vaccination, educational handouts available to patients, and practice process changes to address vaccination at every visit.

Safety

The three types of HPV vaccine include bivalent (2vHPV), quadrivalent (4vHPV), and nonavalent (9vHPV). The nonavalent vaccine is the only HPV vaccine now available in the United States; however, all vaccines have been globally studied and found to be a safe intervention for cancer prevention (CDC, 2019c; World Health Organization, 2018). A safety analysis of the HPV vaccine was conducted with data pulled from the FDA and CDC Vaccine Adverse Event Reporting System between 2006 and 2017 for patients between the ages of 9 and 25 years. There were 26,023 reported adverse reactions in 21 system organ classes (SOC) identified (Jia et al., 2019). Of the 21 SOC, the nervous system accounted for 46% of reported significant adverse events with headache ($p < .001$) and hypoesthesia ($p < .001$) most prevalent (Jia et al., 2019). One of the commonly cited reactions in adolescent patients is fainting after vaccine administration (Beavers & Ramondetta, 2019; CDC, 2019d; Jia et al., 2019).

Efficacy

There are 200 different strains of HPV, 15 of which are carcinogenic (Staples & Duska, 2019). A systematic review and meta-analysis by Drolet et al. (2019) examined 65 articles from multiple countries, with data collected from 60 million subjects, to evaluate HPV vaccine efficacy 4 to 8 years post HPV vaccination. Drolet et al. (2019) recognized significant decreases in HPV infection, genital warts, and CIN2+ in vaccinated participants. Five to 8 years after HPV vaccination, females between the ages of 13 and 19 years had an 83% (RR = 0.17) decrease in HPV 16/18 infections and females between the ages of 20 and 24 had a 66% (RR = 0.34) decrease in HPV 16/18 infections (Drolet et al., 2019). HPV infections of strains 31/33/45 decreased 54% (RR = 0.46) in females between the ages of 13 to 19 (Drolet et al., 2019). Genital warts decreased 67% (RR = 0.33) in females between the ages of 15 and 19; 54% (RR = 0.46) in

women between the ages of 20 and 24; and 31% (RR = 0.69) in females between the ages of 25 and 29 (Drolet et al., 2019). Males aged between the ages of 15 and 19 had a 48% (RR = 0.52) reduction in genital warts, and males between the ages of 20 and 24 had a 32% (RR = 0.68) reduction in genital warts (Drolet et al., 2019). CIN2+ in females ages 15 through 19 decreased 51% (RR = 0.49) and in females ages 20 through 24 CIN2+ decreased 31% (RR = 0.69) five to nine years after vaccination (Drolet et al., 2019). The majority of the reviewed studies (86%) only included females and only data on the bivalent and quadrivalent vaccines were included (Drolet et al., 2019).

Another study, which included females between the ages of 20 and 45 (n = 2374 completed trial) from China participated in a 78-month long placebo-controlled trial using the quadrivalent vaccine. In the per-protocol efficacy population in females aged 20 through 45 years, results demonstrated a 100% (CI = 95%) efficacy of HPV 16/18 (n = 1265) against abnormal, precancerous, and CIN2+ and HPV 6/11/16/18 (n = 1272) associated cervical intraepithelial neoplasia grade 1+ (CIN1+) and CIN2+ (Wei et al., 2019).

Immunogenicity

Women between the ages of 24 and 45 (n = 3,819) in 38 international sites participated in a placebo-controlled vaccination trial using the quadrivalent HPV vaccine. At the 4-year follow-up, data supported the claim that the quadrivalent HPV vaccine is beneficial, safe, and provides immunogenicity over 4 years. After vaccine series completion, subjects who were HPV-negative before vaccination had a high incidence of seroconversion of HPV strains 7 months post vaccination: HPV 6 (98.4%), 11 (98.1%), 16 (98.8%), and 18 (97.3%) (Castellsague et al., 2011). Subjects who were HPV-negative and received the placebo vaccine had 86 new HPV infections compared to the vaccinated per-protocol population, which had 10 new

infections (Castellsague et al., 2011). There was a decrease of 97.4% (95% CI) in HPV-related infections among women with no history of cervical abnormalities or genital warts in the previous 5 years in the per-protocol efficacy (PPE) population (n = 1,578) (Castellsague et al., 2011). This is a notable increase compared to a previous landmark study by Munoz et al. (2009) study in which female subjects between the ages of 24 and 45 years (n = 1,631), resulted in a 90.5% (95% CI) efficacy against quadrivalent HPV-related strains in the PPE group. Women with previous HPV infection exposure without active infection aged 24 through 45 years had a reported efficacy of 66.9% and 81.3% in women 35 through 45 years of age (Castellsague et al., 2011). The higher efficacy of the Castellsague et al. (2011) study is thought to be attributed to the longer follow-up period, which allowed for increased data collection.

Gender and Age Considerations

Limitations of the literature are a lack of studies completed using male subjects and a lack of studies using the nonavalent Gardasil-9 vaccine, which is the only HPV vaccine available in the United States (CDC, 2019c). Giuliano et al. (2015) completed a small study of 150 men who received the quadrivalent HPV vaccine to assess the immunogenicity and safety of the vaccine in this population. The vaccine was well tolerated and 100% of men acquired antibodies to HPV strains 6/11/16/18. The efficacy of the vaccine was not evaluated (Giuliano et al., 2015). A placebo-controlled randomized trial in Japan had an 85.9% ($p < .001$) efficacy in men between the ages of 16 and 26 (n = 1124) (Mikamo et al., 2019). However, 3 years after the vaccination, immunogenicity decreased to 60.7-92.3% from immunogenicity of 97.1-100% at 7 months (Mikamo et al., 2019). There were no serious adverse events (Mikamo et al., 2019).

Herd effect is defined as resistance to the spread of a contagious disease within a population that results if a sufficiently high proportion of individuals are immune to the disease,

especially through vaccination (CDC, 2016). Herd effect from vaccinated women is suspected to decrease HPV infections in men (Drolet et al., 2019). Due to limited data involving male subjects, further research is needed to determine the efficacy and immunogenicity of HPV vaccination in men.

Methods

If the HPV vaccine is administered before exposure to HPV infection, the efficacy of the vaccine is greater than if it is administered after exposure to one or more of the HPV strains in the vaccine (Castellsague et al., 2011). There are strong data supporting benefits of vaccinating men and women beyond the original age restriction. Using updated HPV vaccination guidelines, adult primary care providers need to identify adult patients from 18 through 26 years old who have not received or completed the HPV vaccination series and recommend a catch-up vaccination plan. Adult patients between the ages of 27 through 45 who have not been previously vaccinated and have a risk of acquiring a new HPV infection, need to be identified and participate in shared clinical decision making with their primary care providers to determine if the HPV vaccination series is beneficial for them. If so, the patient should be vaccinated. By implementing this quality improvement project, the adult primary care clinic will be providing eligible patients evidence-based care to improve health outcomes.

Anticipated Outcomes

After reviewing the literature and multiple government agencies' recommendations for HPV vaccination, a protocol was created to improve HPV vaccination rates and reduce missed opportunities for HPV vaccination in the practice. The six goals were expanded to include objectives, project outcomes, and measures (Table 3) which were reviewed and approved by the clinic providers. The clinic providers also reviewed and approved an HPV vaccination protocol

(Appendix A), revised HPV vaccination protocol (Appendix B), and HPV vaccination algorithm for providers (Appendix C) developed by the project leader. Provider II elected to serve as the clinic's HPV vaccination champion promoting HPV immunization throughout implementation and sustaining the project through continued staff education and process evaluations (Lollier et al., 2018).

Table 3

Goals, Objectives, Project Outcomes, and Measures

Goal	Objective	Outcome	Measure
Educate providers, MAs, and clinic staff on HPV to promote positive responses to HPV vaccination as evidenced by 100% attendance at HPV education.	Providers, MAs, and staff will attend education sessions facilitated by project leader.	Attendance at role-specific education by 100% of providers, MAs, and clinic staff.	Attendance at a project leader led 30-minute interactive PowerPoint presentation on HPV, vaccinations, and clinic processes. Education tailored to project roles and provided separately for providers, MAs, and support staff.
Increase patient education from 0% to 80% through patient handouts, passive education, and provider/MA communication of vaccine benefits.	Every patient 18 through 45 will have the opportunity to view educational posters in common areas and will be given an HPV education sheet and/or receive verbal education from provider.	Education provided for 80% of patients 18-45.	HPV Poster placed in common areas of clinic. Educational hand-out provided to each eligible patient upon appointment check-in and/or educated verbally by provider.
Increase identified vaccination opportunities in patients aged 18 through 45 from 0% to	Create HPV Vaccination Opportunity Protocol.	Increase percentage of provider identified vaccination opportunities from 0 to 80%.	Chart audit of eligible patients compared to completed vaccine screening algorithms.

80% using updated CDC guidelines to recognize eligible patients.	Patients 18 through 45 complete vaccine screening algorithm given to them at check-in.	Providers and MAs demonstrate 80% adherence to screening and documentation requirements.	Staff adherence to protocol measured through chart and screening algorithm audits.
Increase provider initiation of a catch-up vaccination plan for male and female patients, aged 18 through 26, who are not sufficiently vaccinated from 0% to 80%.	The provider will identify flagged charts and provide a strong recommendation for HPV vaccine to all eligible patients. Providers will prescribe catch-up vaccination for eligible patients 18 through 26.	Strong provider recommendation, which is supported by the literature as an intervention to improve vaccination rates will occur for 80% of eligible patients. Provider will order HPV vaccine series for 80% of eligible patients; prescription will be provided to patient by provider.	Audit of patient screening algorithms for check mark verifying strong recommendation was made and prescription was provided.
Increase provider initiated shared clinical decision making for male and female adults aged 27 through 45 not adequately vaccinated against HPV, to determine patient benefit of vaccination.	The provider will identify flagged charts and participate in shared clinical decision making.	Provider will initiate shared clinical decision making for 80% of patients 27 through 45 to determine if HPV vaccination is beneficial.	Audit of completed patient screening algorithms verifying provider participated in shared clinical decision making with patient.
Increase HPV vaccination prescription rate.	HPV series vaccine prescription provided to eligible patients.	Providers will provide a prescription for HPV vaccination to 80% of eligible patients.	Audit of completed patient screening algorithms verifying a prescription was provided to eligible patients.

Project Interventions

Providers, MAs, and clinic staff were provided education on the new guidelines for HPV immunization through separate presentations by the project leader which included handouts, a

PowerPoint presentation, and an opportunity for questions. The education was tailored to each of the project roles and designed to promote positive responses to HPV vaccination.

The front desk staff distributed HPV vaccination education sheets (CDC, 2019e) and the eligibility screening algorithm to patients 18 through 45 years of age at check-in (Appendix D). Patients completed the screening algorithm and gave the form to the MA when they were taken to the exam room for vital signs. In the exam room and in the patient restroom, patients received passive education through HPV educational posters which promoted HPV vaccination benefits (Guan, 2014; National Cervical Cancer Coalition, 2019). The MA flagged eligible patient charts by placing the screening form on the patient's clipboard, which prompted the provider to educate the patient, provide a strong HPV vaccine recommendation, and order the vaccine series if appropriate. At the end of the appointment, the screening form was collected by the MA and stored in a secure location for the project leader to review.

Modified Interventions

The Coronavirus Disease 2019 (COVID-19) global pandemic, COVID-19, had a significant impact on project implementation. A complete restructure of patient care was required to maintain staff and patient safety. Clinic staff were required to wear a face mask at all times. The window separating the front desk staff and patient waiting room remained closed and patients were not given any paperwork to complete at the clinic. These changes in clinic process and adaptation to current restrictions caused by the pandemic temporarily limited project implementation, which is reflected in the results.

To limit staff's potential exposure to COVID-19 through patient interaction, it was determined that Provider II would independently implement project interventions. Patient screening forms and educational handouts were no longer provided. Provider II identified

eligible patients by age, provided verbal education, completed the revised screening form (Appendix E) during patient interview, identified vaccination opportunities, and made a strong recommendation for vaccination when indicated. As paper prescriptions were no longer provided to patients and pharmacies were currently only providing mandatory vaccinations, the provider educated patients to obtain vaccine from the preferred pharmacy when available.

Ethical Considerations

This project was submitted for IRB review and was determined to not be research. To protect patient confidentiality, personal addresses and contact information were not collected. Electronic data collected from patients used a patient ID number without patient identifiers. Patient names on screening algorithms were destroyed in a HIPPA compliant shred bin at the end of data entry and not included in any reports. Electronic data being analyzed was stored on a password protected laptop.

Organization Barriers and Facilitators

The organization declined to update the electronic health record to flag providers of eligible patients, implement standing orders, or vaccinate patients on site, which are interventions supported by the literature to increase vaccination rates (Hawk et al., 2017; Lollier et al., 2018; Warner et al., 2017). Paper forms were used to track data and had the potential to be incomplete, lost, or misplaced.

While onsite vaccination would generate revenue and provide easy access to immunizations and increase vaccination compliance (Hawk et al., 2017); the clinic chose not to stock the costly HPV vaccine. This required the patient to obtain the vaccine at a pharmacy or another healthcare site.

Project Implementation

The project was initiated and fully implemented in its original design for 67 days (10 weeks). With the upheaval of the COVID-19 pandemic, implementation was halted mid-project for 26 days. Project modification to align with CDC COVID-19 guidelines was then designed, implemented during week 8, and maintained for the remaining 17 days of the project. After project interventions were modified to provide protections from COVID-19, Provider II was the only provider screening patients for HPV vaccination history and assessing potential HPV vaccination needs.

Patient Visits and Demographics

There were 349 patient visits for 291 unique patients. Of the 291 unique patients, 48 (16.5%) had two visits, six (2.1%) had three visits, two (0.7%) had four visits, and one (0.3%) had five visits in the 10 weeks of project implementation (Table 4). Only one visit was considered for each of the 291 Unique Patients.

Table 4

Visits per Clients in Eligible Age Groups

Demographics		Number of Visits					
		1	2	3	4	5	Total
		n (%)	*n* (%)	*n* (%)	*n* (%)	*n* (%)	*n* (%)
	Male	122 (35)	21 (6)	3 (0.9)	1 (0.3)	1 (0.3)	148 (42.4)
	Female	169 (48.7)	27 (7.7)	3 (0.9)	1 (0.3)	0 (0)	201 (57.6)
Total		291 (83.4)	48 (13.8)	6 (1.7)	2 (0.6)	1 (0.3)	349 (100)

The visit included in unique patient visits was the first visit in which the patient was either screened or the visit in which they were first seen if they were never screened. The unique

clients were primarily female (58.1%, *n* = 169), in the older age group of 27 to 45 years of age (78.7%, *n* = 229), and insured (87.6%, *n* = 255) (Table 5).

Table 5

Demographics of Unique Clients With Clinic Visits February 18, 2020 to April 24, 2020

Demographics		*n* (%)
Sex		
	Male	122 (41.9)
	Female	169 (58.1)
Age Group		
	18-26	62 (21.3)
	27-45	229 (78.7)
Insured		
	Yes	255 (87.6)
	No	36 (12.4)

Provider II saw a greater number of patients in the eligible age groups throughout the 10-week project seeing 217 unique patients while provider I saw 74 unique patients in the eligible age groups. The proportion of patients by sex, age group, and insurance status were similar for both providers (Table 6).

Table 6

Unique Patient Visits per Provider

Provider		I	II
		n (%)	*n* (%)
Total Unique Visits Patients		74 (25.4)	217 (74.6)
Sex			
	Male	35 (47.3)	87 (40.1)
	Female	39 (52.7)	130 (59.9)
Age Group			
	18-26	17 (23.0)	45 (20.7)
	27-45	57 (77.0)	172 (79.3)

Insured		
Yes	65 (87.8)	190 (87.6%)
No	9 (12.2)	27 (12.4%)

Results

Provider Education

An education seminar was held to educate clinic staff and providers on HPV, vaccination benefits, and plan for project implementation. The seminar was attended by 100% of the clinic staff, MAs, and providers. Students present at the time of the seminar participated. Providers were educated on specific roles and provided an algorithm as reference to guide them when determining patient vaccination eligibility. In addition, the project leader supplied a clearly labeled manual for providers, staff, and students to access in the conference room which included a copy of the power point, example of provider flag, patient handouts, educational posters, and provider algorithm. This resource enabled individuals new to the clinic to review the HPV protocol and processes and thereby promote project sustainability. The goal to educate providers, MAs, and clinic staff on HPV to promote positive responses to HPV vaccination was met with 100% participation.

Patient Education

Patients received education through patient handouts, verbal discussion, and educational wall posters. Of the 291 unique visits, 112 (38.5%) patients received education from the educational handouts given to patient at appointment check-in by front desk staff (n = 74, 66%) during weeks 1 through 4 or from provider II post project restructure (n = 38, 34%). The goal to increase patient education of HPV vaccination from 0% to 80% for unique patients educated during active implementation was not met. The goal of 80% or more unique patients

educated was met during the final weeks of project implementation post restructure (Table 7). There were 40 unique visits, 34 patients (85%) received verbal education from provider II.

Table 7

Weekly HPV Patient Education

	Provider I Patients		Provider II Patients		All Patients	
Week	Educated	Missed	Educated	Missed	Educated	Missed
	n (%)	*n* (%)	*n* (%)	*n* (%)	*n* (%)	*n* (%)
1	4 (40.0)	6 (60)	17 (77.3)	5 (22.7)	21 (65.6)	11 (34.4)
2	3 (60.0)	2 (40)	19 (79.2)	5 (20.8)	22 (75.9)	7 (24.1)
3	3 (18.8)	13 (81)	14 (53.8)	12 (46.2)	17 (40.5)	25 (59.5)
4	2 (16.7)	10 (83)	12 (60)	8 (40)	14 (43.8)	18 (56.3)
5	0 (0)	8 (100)	0 (0)	24 (100)	0 (0)	32 (100)
6	0 (0)	10 (100)	0 (0)	26 (100)	0 (0)	36 (100)
7	0 (0)	7 (100)	0 (0)	18 (100)	0 (0)	25 (100)
8	0 (0)	6 (100)	4 (23.5)	13 (76.5)	4 (17.4)	19 (82.6)
9	0 (0)	0 (0)	16 (80)	4 (20)	16 (80)	4 (20)
10	0 (0)	0 (0)	18 (90)	2 (10)	18 (90)	2 (10)
Total	12 (16.2)	62 (83.8)	100 (46.1)	117 (53.9)	112 (38.5)	179 (61.5)

Identified Vaccination Opportunities

The goal was for providers to identify HPV vaccination opportunities in 80% of patients 18 through 45 years of age. Each patient within this age range who visited the clinic was to complete a screening form for the provider to review and determine the patient's eligibility for

vaccination. Of the 349 total eligible patient visits, 243 (70%) patients were missed due to failure of staff to provide a screening form, failure of the patient to complete the screening form, or failure of the provider to complete the screening form. There were 106 (30%) eligible patient visits screened for vaccination opportunity. Of the unique patient visits (n = 291), 100 (34.3%) patients were screened during the 10 weeks of implementation, with 191 (65.6%) missed. During active implementation, there were 184 unique visits. Providers identified 100 (54.3%) patients during this time. While the increase in patients screened for HPV vaccine eligibility from 0% to 54.3% demonstrated exceptional improvement, the increase did not meet the goal of 80%.

Catch-Up Vaccination Plan

The updated CDC guideline recommends males and females ages 9 through 26 who are not vaccinated or are undervaccinated against HPV should complete the HPV series (FDA, 2018). During the 10 weeks of implementation there were 72 (21%) patient visits for 62 (21.3%) unique visits within this age range. Out of the 62 unique visits, 32 occurred during active implementation with providers identifying 19 out of 32 (59.3%) patients as potential vaccination opportunities. Of the patients who completed the vaccination history on the screening form (n = 21, 65.6%), six (28.6%) were never vaccinated, three (14.2%) were unsure if they had been vaccinated, three (14.2%) had started the series previously but were unsure if they had completed the series, and nine (42.8%) patients were fully vaccinated. The provider did not complete the screening form for two patients who initiated the screening form. Providers determined 10 patients of the 19 identified opportunities met criteria for vaccination. Five patients (50%) agreed to initiate the vaccination series and five (50%) declined despite strong provider recommendation. Providers wrote a prescription for each of the five (100%) eligible patients. Providers identified vaccination opportunities for 59.3% (n = 19) of patients 18 through 26 (n =

32) and recommended catch-up vaccination plan for the 10 eligible patients (100%). This met the goal to recommend catch-up vaccination plans for under vaccinated adults 18 through 26 years of age.

Shared Clinical Decision Making

There were 229 patients 27 through 45 years old during the 10 weeks of implementation. Of the 184 unique patient visits during active implementation there were 152 patients within this age group, 81 (53.2%) were screened by a provider, 71 (46.7%) did not complete a screening form or were missed by the providers. The majority of patients who completed the screening form (n = 96, 63.1%) were unvaccinated (n = 78, 81.2%), eight (0.05%) were fully vaccinated, two (0.01%) had started the series, two (0.01%) were unsure if they had completed the series, and six (0.04%) patients were unsure of their vaccination status. Providers determined 72 patients of the 81 patients screened may benefit from HPV vaccination and initiated shared clinical decision making. This met the goal to increase provider initiated shared clinical decision making from 0% to 80% in patients ages 27 through 45 identified as eligible by providers (n = 72, 100%).

HPV Vaccination Prescriptions

There were 42 HPV vaccination prescriptions written by providers during active implementation. Providers evaluated 100 patients and determined 81 (81%) patients were eligible for vaccination. Of the 81 eligible patients, 38 (47%) declined. Patients 27 through 45 (n = 81, 81%) years of age were prescribed the majority of prescriptions (n = 37, 88%). Out of the 43 eligible patients who did not decline, providers wrote prescriptions for 42 (97.7%) of them. Providers met the goal to increase the HPV prescription rate from 0 to 80%.

Strong Provider Recommendation

A chi-square test was performed using IBM SPSS Statistics (Version 26) to analyze the relationship between strong provider recommendation and number of HPV vaccination prescriptions (n = 42) provided to unique patients evaluated by one of the providers for vaccination eligibility (n = 100) (Table 8). It was determined that there is a statistically significant relationship ($p < .000$) between a strong provider recommendation and the patient's willingness to start or complete their HPV vaccination.

Table 8

Relationship Between Strong Provider Recommendation and HPV Vaccine Prescriptions Provided to Patients

Test	Value	Df	Asymptomatic Significance (2- sided)
Pearson Chi-Square	32.534[a]	2	.000
Likelihood Ratio	43.691	2	.000
Linear-by-Linear Association	0.583	1	0.455
N of Valid Cases	100		

Note. 0 cells (0.00%) have expected count less than 5. The minimum expected count is 5.46.

Discussion

The clinic made significant progress during the 10 weeks of implementation. There were a total of 349 visits for 291 unique patients. Due to the upheaval of COVID-19, the clinic paused project implementation for 4 weeks during which the project leader reconstructed interventions to align with new safety measures. Patient visits during the 41 days of active implementation were used to evaluate outcome of project goals.

Providers identified vaccination opportunities in 100 of the 184 patients 18 through 45 years of age, improving rate of identified vaccination opportunities from 0% to 54.3% during the 41 days of active implementation. Aligning with research findings, the use of a strong provider recommendation for vaccination significantly improved acceptance of vaccine prescriptions ($p <$ .000). Only nine of the 21 patients in the 18 through 26 age group were fully vaccinated (42.8%). This supports the concern that over half of adolescents are transitioning into primary care undervaccinated against HPV (Walker et al., 2019).

The majority of the 291 unique visits were patients 27 through 45 ($n = 152$). Providers identified 81 vaccination opportunities and initiated shared clinical decision making with 72 patients who may benefit from HPV vaccination. The majority of patients in this age group who completed the screening form ($n = 96$, 63.1%) were unvaccinated ($n = 78$, 81.2%). The high number of unvaccinated adult patients in the clinic supports the poor HPV vaccination rate in the United States (Walker et al., 2019).

The majority of the patient population evaluated by provider I fell outside of the project's required age range. Provider II had more than four times the number of patients in the 18 through 45 age group than Provider I. Provider II as the project champion had an increased focus on the HPV immunization project which resulted in greater success following the protocol and identifying patients eligible for vaccination. While the vaccination champion demonstrated greater success in prescribing HPV vaccinations, as seen by Lollier et al (2018), this success did not improve the adherence of other staff and providers. There remains a need to have continued conversation regarding new initiatives with all providers and impacted staff, especially when the volume of patients in the eligible age group is disproportionate.

Response to a Global Pandemic

Four weeks into the project implementation, the coronavirus (COVID-19) global pandemic had a direct effect on clinic operations. The clinic had to quickly implement new procedures to respond to the challenges caused by the pandemic to protect the health and safety of staff and patients. The lack of knowledge about this virus heightened the urgency to develop safe and effective procedures to triage, evaluate, and treat sick patients.

At the onset of the COVID-19 pandemic, the primary care clinic required a period of adjustment. Over a period of 26 days the project was restructured. New clinic processes were developed and implemented to promote staff and patient safety. During this time of transition and restructure the identification of vaccination opportunities, patient education, and provider recommendations related to HPV vaccination was limited and is reflected in the weekly results. The project leader conducted a focused interview with one of the providers, held meetings with the staff, completed an assessment of the new clinic processes, and developed a revised implementation plan in collaboration with the clinic staff and providers. The new process was implemented in week 8.

During times of a public health emergency, primary care clinics need to be prepared to respond to the crisis and continue to provide quality healthcare. Emergency departments are overwhelmed, resources are limited, and patients need access to quality healthcare. Primary care clinics can decrease the burden experienced by emergency departments by providing crucial patient screening, continuing routine patient care, providing outpatient care of infected patients, and monitoring ill patients for worsening symptoms (Williams et. al., 2017).

Previous pandemics and public health emergencies have provided baseline knowledge on emergency preparedness. In 2009, the H1N1 influenza pandemic raised serious concerns about

lack of preparedness to handle a sudden influx of sick patients. During that time, primary care clinics across the world struggled to meet the patient care demand. In Australia, Israel, and England, a qualitative descriptive study interviewed 65 primary care providers and identified three common challenges: sudden increase in workload, difficulty implementing existing emergency response policies, and difficulty communicating with public health officials (Kunin et. al., 2015). On the other side of the world in Victoria, British Columbia, Canada, providers were facing similar challenges. A provider documented their personal experience responding to the H1N1 pandemic during which personal protective equipment (PPE) was very difficult to obtain from the country's stockpile and the requested orders were partially filled or not filled at all, policies put in place by public health administrators delayed patient care and increased provider workload such as restrictions on patient testing, the backlog of lab results required providers to call the lab for patient results, and poor communication occurred between providers and the health department (Eizenberg, 2009).

The clinic showed resilience in a time of crisis requiring activation of emergency response policies. The providers had a large influence on the clinic's response to the pandemic and implemented changes in policy and procedures to ensure the safety of staff and patients. After the project interventions were adjusted to accommodate new clinic processes, a one provider assumed the responsibility of restarting the HPV vaccination project following the collaboratively developed design which accommodated the needed changes for staff, provider, and patient safety. In the results, the commitment of the clinic to the project is demonstrated. Post restructure, the number of missed patients decreased (Table 9), education of patients increased (Table 7), and there was an increase in HPV immunization prescription rates (Table 9). These results indicate the restructure of the project to one provider, designating a vaccination

champion, and limiting the number of clinic staff required to implement interventions, had a positive impact on outcomes of project objectives.

Table 9

Provider Identified Vaccination Opportunities and Prescription Rate

Week	Unique Patients	Missed	Not Eligible	Eligible, Declined	Eligible, Willing	HPV Prescriptions
1	32	13	4	10	5	5
2	29	12	1	9	7	6
3	42	29	3	4	6	6
4	29	16	3	4	6	6
8	12	8	2	0	2	2
9	20	4	2	6	8	8
10	20	2	4	5	9	9
Total	184	84	19	38	43	42

Limitations

The use of paper for data collection and lack of an electronic physician flag potentially limited the number of identified vaccination opportunities. Due to the clinic's resistance to alter the electronic health record to flag providers, the patient screening form served as the flag when it was placed on the patient's clipboard, in front of the billing sheet. Initially, the MAs were placing screening forms behind the billing form causing the providers to miss the flag. The MAs were re-educated on the implementation process and placement of the provider flag. This re-education immediately improved and sustained placement of the flag. To assure sustainability, providers were alerted to potential misplacement of the flag and asked to check behind the billing sheet if the screening form was missing for patients aged 18 through 45 years old.

Project implementation was challenged by the unexpected world pandemic caused by COVID-19. The clinic experienced an increase in demands, resources, and time to respond to this public health crisis. In order to provide safe care for the patients and protect the staff, many changes were made to clinic processes, which impacted the implementation of this project and its results.

Recommendations

After analyzing the results, HPV vaccination opportunities in adults 18 through 45 improved when interventions eliminated the involvement of clinic staff and the MAs in the screening process and limited the project to one practitioner. This improvement may be due to the decrease in the reduction in the use of paper screening tools and the shift to the provider incorporating HPV vaccination screening into their routine patient interview. The project was initially dependent on front desk staff providing eligible patients the screening form and MAs placing the completed screening form as a provider flag. After the intervention was modified to include only one provider who was responsible for identifying patients within the required age range, identified vaccination opportunities improved.

The clinic was resistant to many of the evidence-based interventions to improve vaccination rates. Evidence-based interventions that incorporate the effective use of technology eliminate the multiple hands required in implementation of the new intervention and eliminate the use of paper which has the potential for loss and misplacement. While the provider can initially sustain a new process that they are championing, methods and processes must be made to support the initiative long-term. Therefore, it is recommended that the new processes be incorporated into the electronic medical record.

The clinic was not actively updating patients shot records. If the clinic began updating shot records at each visit, this would prevent wasted resources screening patients who have been vaccinated. Providing on-site vaccination may have improved patient initiation of series.

Implications for Practice

This quality improvement project was implemented at a primary care clinic to increase identified HPV vaccination opportunities in adults 18 through 45 using the 2019 CDC guidelines. During the 6 weeks of active project implementation, 117 unique patients completed the screening algorithm, 71.8% had not been vaccinated against HPV. This is a representation of the low HPV vaccination rates in the US. Other clinics may implement this project to improve the quality of care delivered to their patients and promote a healthier community through prevention of HPV-related cancers. Future clinics should consider the value of DNP prepared NPs being experts in implementing evidence-based practice. Decreasing the number of clinic staff involved in project implementation had a positive impact, which should be considered for future quality improvement projects.

Conclusion

Taking into consideration the global pandemic which interrupted the middle of implementation, the clinic made great improvements in the recognition of HPV vaccination opportunities in the adult patient population. The identification of vaccination opportunities improved from 0% to 54.3% for unique patients during 6 weeks of active implementation. Providers identified 43 patients who were eligible for vaccination and provided prescriptions for 42 patients. This 97.7% prescription rate, a statistically significant increase from the pre-project rate of 0% ($p < .000$) provides other primary clinics motivation to undertake projects to improve the uptake of HPV vaccinations and reduce the related cancer rate.

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Appendix A

HPV Vaccination Protocol

1. Every patient 18 through 45 will be given an HPV education form and screening algorithm by the front desk staff at check-in.
2. The MA will review the completed screening algorithm and flag positive patient charts for provider review by placing on patient's clipboard outside of exam room door.
3. The provider will identify flagged charts and provide a strong recommendation for HPV vaccine to all eligible patients.
4. Providers will prescribe catch-up vaccination for eligible patients 18 through 26.
5. For patients 27 through 45, providers will participate in shared clinical decision making with the patient to determine vaccination benefit.
6. For eligible patients, provider will provide patient with prescription for vaccine.
7. HPV vaccination is to be addressed at every appointment, for every eligible patient.

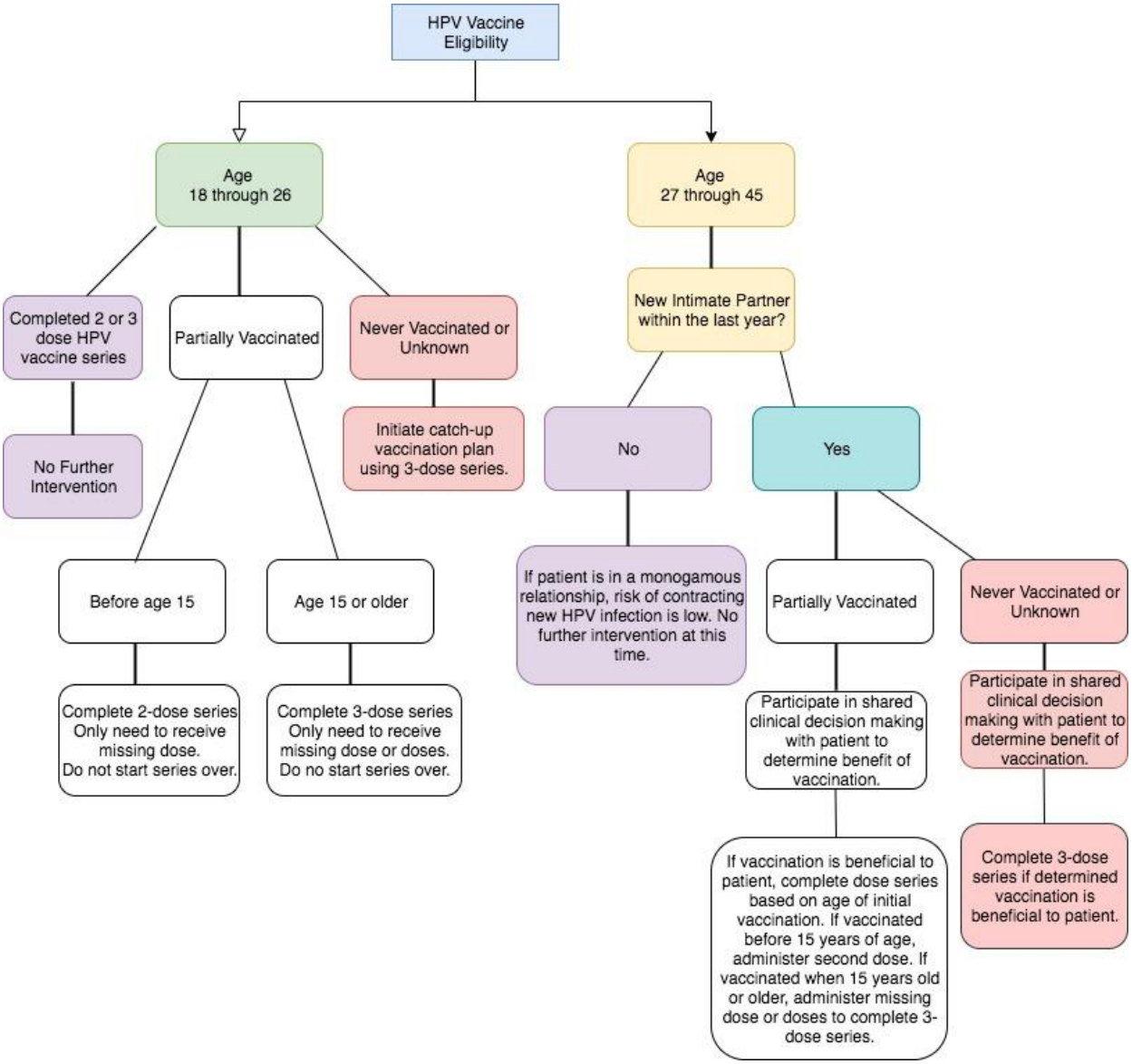
Appendix B

Revised HPV Vaccination Protocol

1. Every patient 18 through 45 will be screened by the provider during the patient's appointment.
2. Patient education will be provided verbally by provider during appointment. Patient will be advised to initiate vaccination through pharmacy of choice.
3. The provider will identify eligible patients and provide a strong recommendation for HPV vaccine to all eligible patients.
4. Provider will recommend catch-up vaccination for eligible patients 18 through 26.
5. For patients 27 through 45, providers will participate in shared clinical decision making with the patient to determine vaccination benefit.
6. HPV vaccination is to be addressed at every appointment, for every eligible patient.

Appendix C

HPV Vaccination Algorithm for Provider



Appendix D

Patient Screening Form

Name: _____ Age: _____ **Male _____Female _____**

I was given the HPV education sheet: Yes _____ No _____

1. **Have you ever been vaccinated for HPV?**

   Yes _____ No _____

2. **If yes, did you complete the vaccine series?**

   Yes _____ No _____ Unknown _____

3. **If previously vaccinated, what age did you start the HPV vaccine series? _____**

For provider:

Strong recommendation? Yes _____ No _____

Patient Declined: Yes _____ No _____

If yes, reason: _____

Prescription Sent to Patients Pharmacy of Choice? Yes _____ No _____

Appendix E

Modified Screening Form

Name: _____ Age: _____ **Male _____Female _____**

Patient education provided: Yes _____ No _____

1. **Have you ever been vaccinated for HPV?**

   Yes _____ No _____

2. **If yes, did you complete the vaccine series?**

   Yes _____ No _____ Unknown _____

3. **If previously vaccinated, what age did you start the HPV vaccine series? _____**

Strong provider recommendation? Yes _____ No _____

Patient Declined: Yes _____ No _____

If yes, reason: _____

Prescription sent to patient's pharmacy of choice? Yes _____ No _____