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# HPV Vaccine Hesitancy: Improving Vaccination Rates in the Pediatric Primary Care Setting

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**Abstract**

**Problem statement:** The Human Papillomavirus (HPV) vaccine protects against carcinogenic strains of HPV and is administered during childhood to provide maximum protection during peak risk for exposure and HPV disease. Despite demonstrated efficacy, HPV vaccine hesitancy leads to decreased vaccination rates in the pediatric primary care setting. **Purpose:** This quality improvement project aims to improve HPV vaccination rates at SouthernMED Pediatrics, Summerville, South Carolina. **Methods**: A pre-intervention survey was administered to identify parental concerns regarding the HPV vaccine to create a customized educational handout. Health care providers systematically used motivational interviewing, presumptive approach communication techniques, and a customized educational handout to make the HPV vaccine recommendation. **Analysis:** Vaccination rates pre and post intervention were reported from the electronic health record ($n$ = 89). Statistical analyses assessed the quality improvement interventions. **Results:** HPV vaccination rates at SouthernMED Pediatrics in Summerville, South Carolina increased from 55% pre-intervention to 76.4% post intervention. Vaccination status was significantly influenced by the type of communication technique used in relation to patient age ($p$ = .044, and $p$ < .001). **Implications for Practice:** Improving HPV vaccination rates in the pediatric primary care setting helps to provide greater community protection against HPV and improves long term health outcomes.

*Keywords*: Human Papillomavirus vaccine, HPV vaccination, motivational interviewing, presumptive approach communication, customized educational handouts, same day vaccination, vaccine acceptance

**HPV Vaccine hesitancy: Improving Vaccination Rates in the Pediatric Primary Care Setting**

HPV is the most common sexually transmitted infection in the United States, with prevalence rates estimated 40-45%, with approximately 14.1 million new infections each year (Lewis et al., 2021; McQuillan et al., 2017; Voss & Wofford, 2016). There are several carcinogenic strains of HPV that can give rise to HPV related cancers in both males and females. HPV related cancers demonstrate peak incidence from 20 to 40 years of age (Lewis et al., 2021).

Early vaccination is more effective and protective against carcinogenic strains than delaying immunization, significantly influencing morbidity and mortality later in life (Harberger, 2018). Administration of the HPV vaccine to an HPV naïve individual, before natural exposure in the community, provides almost absolute protection from carcinogenic strains (Bowden et al., 2017). Initiation of the HPV vaccine series prior to age 15 years not only provides increased protection through immunologic mechanisms, but also demonstrates better vaccine series completion rates (O'Leary & Nyquist, 2019). The American Academy of Pediatrics (AAP) and the Centers for Disease Control and Prevention (CDC) recommend routine vaccination of children against HPV, starting at ages 9 to 11 years (Center for Disease Control and Prevention [CDC], 2021; American Academy of Pediatrics [AAP], 2017). Vaccination reduces morbidity and mortality due to HPV related cancers and alleviates health care costs on the system related to the care of these individuals.

Despite upward trends in national HPV vaccination rates over the past two decades, HPV vaccination rates continue to trail other childhood immunizations. As of 2021, 58.6% of

adolescents in the United States have fully completed the HPV vaccine series. South Carolina trails the national average with a 47% vaccination rate (United Health Foundation, 2021). Common reasons for vaccine hesitancy or refusal are parental concerns over the safety of the vaccine, and the perception their child is not vulnerable to HPV related cancers (Javaid et al., 2017). Parents also commonly believe the vaccine is not necessary before becoming sexually active and are concerned the vaccine series consists of two to three injections (Javaid et al., 2017).

In the Summerville, South Carolina community, it is anecdotally noted that families who report stronger religious affiliations and beliefs are less likely to accept the HPV vaccine. The evidence demonstrates reduced HPV vaccination rates in populations who report higher religiosity, which is defined as affiliation to a religious organization or strong religious beliefs (Best et al., 2019). Sexual activity is thought to be the driving force behind this phenomenon, as sexual behavior, including abstinence before marriage, can be strongly influenced by religious beliefs (Best et al., 2019). It has been observed families and patients with reports of strong religious beliefs are more likely to practice abstinence before marriage than their less religious counterparts. In general, more religious families believe that their child is not at risk for HPV disease and perceive the HPV vaccine as unnecessary. Discussions regarding sexual activity in the future are often attempted by providers, stressing that even if their child practices abstinence before marriage, their future spouse may not, leaving them vulnerable to HPV-related infections and cancer. Knowledge of the HPV vaccine was lower among highly religious

individuals, and poor knowledge of rates of HPV disease and the HPV vaccine is associated with lower HPV vaccination rates (Birmingham et al., 2018).

The evidence is not definitive if race and ethnicity are significant factors of HPV vaccine hesitancy, with several studies in agreement that there were no differences in HPV vaccination status across ethnicities in pediatric populations (Agenor, et al., 2020; Franco et al., 2019). Socioeconomic status significantly correlated with HPV vaccination across several studies, which could be a confounding factor when examining racial or ethnic disparities and must be controlled for (Agenor et al., 2019; Franco et al., 2019; Galbraith-Gyan, et al., 2019). National data demonstrate HPV vaccine rates are lowest among Southeastern states, primarily states with higher percentages of religious adults and adults who identify with conservative political ideology (Franco et al., 2019).

Initiatives to improve the health care providers' recommendation of the HPV vaccine are expected to improve HPV vaccine initiation and completion rates. Standardization of the provider's HPV vaccine recommendation using motivational interviewing, presumptive approach communication techniques, and written educational materials, have demonstrated efficacy in the literature at improving vaccination rates (Dempsey et al., 2018; Dempsey et al., 2019).

## Background

The HPV vaccine protects against carcinogenic strains of HPV and is administered during childhood to provide maximum protection during peak risk for exposure and HPV disease. HPV

vaccine hesitancy remains a significant clinical issue at SouthernMED Pediatrics in Summerville, South Carolina. Prior to project implementation, 55% of eligible patients at SouthernMED Pediatrics in Summerville, had completed the entire vaccine series (H. Gould, personal communication July 29, 2022). This is higher than the state vaccination rate of 47% but remains below the national vaccination rate of 58.6% (United Health Foundation, 2021).

Interventions involving the use of specialized communication techniques and printed educational materials have been employed to improve either parents' intent to administer the HPV vaccine (either initial or subsequent dose) or same day HPV vaccination rates (Dempsey et al., 2018; Reno et al., 2019). Vaccine hesitancy and refusal can be mitigated through shared decision making, a process through which the healthcare provider and patient or parent actively engage in a cooperative effort to design and implement the plan of care (Harry et al., 2021). Concepts of shared decision making are fundamental to communication training for healthcare providers. Motivational interviewing is a specific communication technique providers use to actively engage patients and parents/caregivers in shared decision making. Motivational interviewing is a technique of methodical counseling that enhances a patient's intrinsic motivation to create a behavioral change (Motivational Interviewing Network of Trainers, 2019). Many studies have demonstrated motivational interviewing as a successful and significant communication tool utilized in shared decision making, leading to same day vaccine administration, especially when providers undergo systematic training and consistently apply the technique (Reno, et al., 2019; Dempsey et al., 2019; Lockhart et al., 2018; Rutten et al., 2017).

Utilization of a presumptive approach of communication when recommending the HPV vaccine is also a well-established and effective method for improving vaccination rates (Abdullahi et al., 2020; Smith et al., 2016; Lockhart et al., 2018; Bowden et al., 2017; Shay et al., 2018). When using a presumptive approach to make the recommendation for vaccination, the provider uses language that assumes same day vaccination will occur (Dempsey et al, 2018). This communication technique is less structured and standardized than motivational interviewing, but scripted narratives to initiate the HPV recommendation using a presumptive approach can be executed uniformly and ubiquitously among providers.

Written educational materials with general information about the HPV vaccine and HPV disease are effective tools for improving HPV vaccination, especially when utilized in conjunction with communication techniques (Dempsey et al., 2018; Renosa et al., 2021; Lockhart et al., 2018). In particular, the distribution of written educational materials that address population (patient and parent) specific concerns regarding the HPV vaccine are most effective, when compared to non-customized written materials, at improving intent to vaccinate and same day HPV vaccination rates (Dempsey et al., 2018; Panozzo et al., 2020; Sackey et al., 2022; Renosa et al., 2021).

Implementation of motivational interviewing, presumptive approach techniques, and customized educational handouts in the health care provider's recommendation of the HPV vaccine at SouthernMED Pediatrics in Summerville aimed to improve same day vaccination rates. The project was strongly supported by practice administration, leadership, providers, and clinical staff.

## Methods

The Health Belief Model was used to discern if a standardized approach to vaccine recommendations improved HPV vaccine initiation and completion rates. The Health Belief Model is widely used for research and quality improvement initiatives involving communication and the implementation of different communication techniques to address a range of health outcomes (Jones et al., 2015). The Health Belief Model is based upon six essential constructs that facilitate behavioral changes: perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cue to action, and self-efficacy (LaMorte, 2019).

In this quality improvement project, perceived susceptibility to HPV disease and perceived disease severity, coupled with perceived benefits of HPV vaccination, effective cues to action and feelings of self-efficacy, coincide with perceived barriers to vaccination to achieve same-day vaccination. Parents and patients need to believe the patient is susceptible to contracting HPV disease in the community, the medical and social consequences of HPV infection are serious enough to impact their social and physical health, and that vaccination is effective and safe. Perceived barriers to HPV vaccination may include religiosity, cultural values, and lack of knowledge about the vaccine, and can be overcome with effective cues to action through the health care provider's recommendation (Best et al., 2019). The healthcare provider cued patients and parents to action through the specific communication techniques of motivational interviewing, presumptive speech, and customized educational handouts, engaging families in a shared decision-making process to accept same-day vaccination. The

intent was for parents and patients to feel confident in their ability to make safe and beneficial decisions about their child's health, leading to same-day vaccination.

**Project Measures**

This quality improvement project focused on the outcome measures of pre and post intervention HPV vaccination rates. The project aimed to improve HPV vaccination rates above the current 55% vaccination rate for SouthernMED Pediatrics' Summerville clinic. Vaccination rates were measured pre-intervention and immediately following the conclusion of the three-month data collection period. The project lead was responsible for collecting measures of HPV vaccination rates. HPV vaccination status was retrieved from the electronic health record (EHR), eClinicalWorks. SouthernMED Pediatrics is a privately owned company, and deidentified data retrieval is an informal process. Requests for data retrieval were made via email to the Information Technology Department; point of contact is Hannah Gould. Data is provided via excel worksheet over Microsoft Outlook.

Measures of healthcare provider utilization of motivational interviewing, presumptive approach communication techniques, and customized educational handouts were collected through provider surveys. Providers were asked to keep concise daily records of interventions employed when same-day HPV vaccination was offered. These logs identified whether the eligible patient received or declined the vaccine, the number of HPV vaccines before and after the selected visit, and the specific intervention techniques employed. Refer to Appendix A to review the provider intervention log with a documented example. The project lead verified the provider logs with documented HPV vaccine administration once weekly. The patient's initials

were the only identifying information included and were used solely for the purpose of facilitating the verification process in the EHR. Weekly reports of intervention use were reviewed with participating providers. HPV vaccination measurements were shared with leadership in the middle of the intervention implementation period and at the conclusion of data collection.

Demographic data was collected from the EHR. Patient age, gender, socioeconomic status, race, and ethnicity were collected. Socioeconomic status was recorded as having either private or public insurance. This information will be used to better understand if there are significant differences in same day HPV vaccination rates by patient's gender, identified race, or ethnicity. This data has the potential to give insight into factors that contribute to HPV vaccine hesitancy, as previously discussed. Results of correlation analyses with same day HPV vaccination rates will be included in the final reports disseminated to providers in the practice and organizational leadership.

**Project Tools**

The project interventions included concerted use of motivational interviewing, presumptive approach communication techniques, and a customized educational handout as a part of the healthcare provider's recommendation for the HPV vaccine during the 11-year to 18-year well checks for children eligible to receive the HPV vaccine. These communication techniques have demonstrated efficacy at helping to improve same day HPV vaccination rates when used separately or collectively, as components of the healthcare provider's recommendation for the HPV vaccine (Dempsey et al., 2018; Reno et al., 2019).

Information pertaining to community specific HPV vaccine concerns were collected in a pre-intervention survey. This optional and anonymous survey (Appendix B), composed by the project lead, was distributed to parents who declined the HPV vaccine for their child. The survey was offered for eight weeks prior to the start of the intervention. Answers were reviewed and contributed to the development of the population-specific educational handout about the HPV vaccine that was part of the intervention (Appendix D).

Training sessions for participating health care providers and clinical staff were provided prior to the implementation period. Concepts of motivational interviewing and presumptive approach communication techniques were reviewed with participating providers during an hour-long training session. Providers were not asked to come early or stay late from work, and overtime was not required for these teaching sessions. Additional sessions were scheduled according to provider request. Information regarding these communication techniques were primarily presented in Power-point with lecturer demonstration, and providers were then given a chance to practice these techniques in five-to-ten-minute sessions at the conclusion of the lecture. Clinical staff were briefed on the planned timeline of project implementation and were instructed to distribute a custom-made HPV Vaccine educational handout to the parents of all eligible patients at the 11-year to 18-year well child check.

**Data Monitoring Plan**

The EHR was utilized to verify provider logs, documented HPV vaccination, and patient demographic information pertaining to identified religion, ethnicity, gender, and patient age. The project lead reviewed provider logs weekly and providers were briefed on intervention

utilization with concerted efforts to troubleshoot any issues with workflow or intervention implementation. There were monthly briefings throughout the project implementation period with providers and clinical staff to briefly discuss progress and any issues. HPV vaccination rates were measured pre-intervention, in the middle of the intervention period, and at the conclusion of data collection. Demographic information was collected throughout the implementation period as patient visits were verified in the EHR.

**Data Analysis Plan**

This quality improvement project collected data pertaining to patient age, gender, ethnicity, religious affiliation, Human Papillomavirus (HPV) vaccination status, socioeconomic status, and intervention. Descriptive analyses, nonparametric statistical analyses, and correlational statistics were utilized to analyze the data. Nonparametric statistical analyses, such as the Mann-Whitney U test, were utilized to analyze the nominal data to determine if the interventions significantly improve HPV vaccination rates. Frequencies and percentages of ethnicity, age, religious affiliation, socioeconomic status, gender, and HPV vaccination were calculated. The Pearson correlation was used to analyze potential correlation between demographic and social variables and HPV vaccination status. Pre-intervention, mid-intervention, and post-intervention HPV vaccination rates were measured. Statistical analyses were used to determine if the interventions significantly improved HPV vaccination rates, and to better understand relationships between other variables and HPV vaccination. The results of data analysis were disseminated to other clinical staff and healthcare providers within the SouthernMED Pediatrics network, as well as company leadership.

**Timeline and Budget**

The quality improvement project followed a precise timeline, with the majority of project implementation occurring in the first quarter of 2023 (Appendix C). The project did not pose any extra demands on the clinic budget. Staff were not subjected to overtime hours for project training or implementation, and no additional materials were required. While the project aimed to improve HPV vaccination rates, demand for the vaccine did not exceed current clinic supply. The project proposal was submitted to the University of South Carolina Institutional Review Board and determined to be exempt, as it did not involve the use of human subjects.

## Results

There were 89 subjects included in the project conducted from January 10, 2023, to April 10, 2023. Project sample was predominantly White and of non-Hispanic ethnicity. Approximately two thirds of the patient population, 62.9%, identified themselves as White, while 29.2% identified as Black, 2.2% identified as Asian, and the remaining 1.1% declined to answer. Most patients, 83.1%, were identified as non-Hispanic and 10.1% reported their ethnicity as Hispanic, 1.1% as American Indian, and 5.6% declined to report an ethnicity. The distribution of patients between sexes, male and female, were 47.2% and 52.8%, respectively. There were no other options of reported sex in the EHR. The age of project participants ranged from 11 years of age to 19 years of age, with a mean age of 13.12 years. Insurance was used to categorize socioeconomic status. This has been used in many studies and is an accepted method of stratifying subjects. Participants who are insured through Medicaid and are eligible

for The Vaccines for Children (VFC) Program are designated as VFC patients and comprise 49.4% of participants. Privately insured participants account for the remaining 50.6%. All data analyses examining vaccination status by demographic factors, provider, communication techniques used, and patient age groups were conducted using chi square testing.

**Differences in Vaccination Status by Demographics Factors**

The relationship between same day vaccination rates varied by demographics. Data revealed 73.8% of males and 78.7% of females accepted same day vaccination. There was not a statistically significant difference between males and females ($p$ = .586). The clinical significance of greater equity between vaccination rates of males and females is paramount in the evolution of beliefs and practices regarding the HPV vaccine.

Insurance type was statistically significant in relation to vaccine acceptance status. There was a statistically significant difference in same day vaccination between those with Medicaid and those with private insurance (88.6% and 64.4% same-day vaccine acceptance, respectively) ($p$ = .007). Race was statistically significant in relation to vaccination status ($p$ = .005), with 67.8% of White patients and 93.8% of all non-White patients accepting the vaccine. Ethnicity was not statistically significant in relation to vaccination status nor in same-day vaccine acceptance ($p$ = .586 and $p$ = .861, respectively), with 77% of non-Hispanics, 77.8% of Hispanics, and 100% of American Indians (1 patient) accepting same day vaccination.

Table 1. Same Day Vaccination Rates by Demographic Factors
*Population (N=89)*

| Characteristic | Declined Vaccine (%) | Accepted Vaccine (%) | |
|---|---|---|---|
| | | | *p* |
| All Patients | 21 (23.6) | 68 (76.4) | |
| Sex | | | .586 |
| Male | 11 (12.3) | 31 (34.8) | |
| Female | 10 (11.2) | 37 (41.6) | |
| Insurance | | | **.007** |
| VFC | 5 (5.6) | 39 (43.8) | |
| Private | 16 (17.9) | 29 (32.6) | |
| Race | | | **.005** |
| White | 18 (20.4) | 38 (43.1) | |
| Non-white | 2 (6.2) | 30 (93.8) | |
| Ethnicity | | | .861 |
| Non-Hispanic | 17 (20.2) | 57 (64.8) | |
| Hispanic | 2 (2.3) | 7 (8.3) | |
| American Indian | 0 (0) | 1 (1.2) | |

*p value derived from chi square testing

**Difference in Vaccination Acceptance Rates by Communication Techniques**

The three-month intervention period yielded a 76.4% vaccination rate among the 89 participants. The educational handout was given to all participants. The handout was distributed to patients and families by the clinical staff, was readily available in the exam room, and was given to families by the provider if not previously introduced. The educational handout alone was utilized in 25.8% of the encounters. The educational handout and motivational interviewing were utilized together in 18% of the encounters, and the educational handout and presumptive approach were used together in 31.5%. The educational handout, motivational

interviewing, and presumptive approach communication styles were all used in the remaining 24.8% of encounters.

There were appreciable differences in vaccination acceptance rates by provider. One Pediatric Nurse Practitioner (the project lead) had a 77% vaccination acceptance rate, one physician had an 88.5% vaccination rate, and a second physician had 60.7% vaccine acceptance. The differences between provider utilization of communication techniques are outlined in Table 1. Providers were free to choose which techniques to utilize for each encounter; preferences or determination of viable pathways led to patterns in communication technique utilization.

Table 2. Provider Utilization of Communication Techniques

| | Educational Handout Only (%) | Educational Handout and Presumptive Approach (%) | Educational Handout and Motivational Interviewing (%) | Educational Handout, Presumptive Approach, and Motivational Interviewing (%) |
|---|---|---|---|---|
| Provider 1 | 3 (11.5) | 9 (34.6) | 0 (0) | 14 (53.8) |
| Provider 2 | 7 (20) | 4 (11.4) | 16 (45.7) | 8 (22.8) |
| Provider 3 | 13 (46.4) | 15 (53.5) | 0 (0) | 0 (0) |

$p < .001$
*p value derived from Chi Square testing

Differences among individual techniques' efficacy and same day vaccination was examined using Chi Square testing. When examined individually, neither motivational interviewing nor presumptive approach communication techniques demonstrated a significant difference in vaccine acceptance ($p$ =.602, $p$ = .107). There was also no statistically significant

difference between the use of all the communication techniques in combination ($p$ = .092). Participants who received the educational handout and presumptive approach combination accepted the HPV vaccine 78.6% of the time. Recipients of the educational handout and motivational interviewing combined had a 93.8% same day vaccination rate. Same day vaccination was 59% when the educational handout, motivational interviewing and presumptive approach communication techniques were all used together.

Table 3. Vaccination Acceptance by Communication Technique Utilized Population (N=89)

| Communication Technique | Declined Vaccine (%) | Accepted Vaccine (%) | P |
|---|---|---|---|
| Educational Handout and Motivational Interviewing | 1 (1.1) | 15 (16.8) | .602 |
| Educational Handout and Presumptive Approach | 6 (6.7) | 22 (24.7) | .107 |
| Educational Handout, Motivational Interviewing, and Presumptive Approach | 9 (10.1) | 13 (14.6) | .092 |

*p value derived from chi square testing

**Differences in Vaccination Status by Patient Age**

Patient age was statistically significant with same day vaccine acceptance ($p$ = .012) with a mean age of vaccine acceptance of 12.85 years. Routine vaccination starts at 11 years, with catch up opportunities at subsequent annual well checks. Vaccine acceptance was stratified into two separate categories; patients 11-years of age, and patients 12-years of age and older. Patients were stratified by vaccination status; declined vaccine, received initial dose, and continuing towards series completion. Most 11-year-old patients encountered during the

project period (86.4%) received their first dose of the vaccine series (Table 4). The one 11-year-old patient who was eligible received the second dose of the vaccine series during the project implementation. Most parents chose to administer the second dose in the series at the next annual well child visit, but some chose to return at the shortest interval between doses, to receive the second dose six months after the first.

Table 4. 11-Year-Old Same Day Vaccine Acceptance Population (N = 22)

| | Number of Patients | % patients |
|---|---|---|
| Declined vaccine | 2 | 9.1 |
| Received initial vaccine | 19 | 86.4 |
| Continued towards series completion | 1 | 4.5 |

The differences in 11-year-old vaccination status, either declination, initiation, or working towards series completion, and same-day vaccine acceptance were statistically significant ($p$ = .044). For 11-year-olds initiating the vaccine series, 47.3% were given motivational interviewing alone with the educational handout, 42.1% were given presumptive approach communication techniques with the educational handout, 5% were given the educational handout and engaged in both motivational interviewing and presumptive approach techniques, and 5% were given the educational handout only. Among 11-year-olds who received the first dose of the series prior to the project implementation and were returning for the second dose of the series, 100% received the educational handout as their only intervention during the project implementation.

Table 5. Same Day Vaccination Status by Communication Technique Utilized for Patients 11-Years-Old and Older
Population (N = 22)

| | Received Educational Handout Only (%) | Received Educational Handout and Motivational Interviewing (%) | Received Educational Handout and Presumptive Approach (%) | Received Educational Handout, Presumptive Approach, and Motivational Interviewing (%) | Total |
|---|---|---|---|---|---|
| Declined Vaccine | 0 (0) | 0 (0) | 2 (100) | 0 (0) | 2 |
| Received Initial Dose | 1 (4.5) | 9 (40.9) | 8 (36.3) | 1 (4.5) | 19 |
| Continuing towards Series Completion | 1 (4.5) | 0 (0) | 0 (0) | 0 (0) | 1 |
| Total | 2 | 9 | 10 | 1 | 22 |

*p* = .044
*p value derived from Chi Square testing

Same day vaccination status for all patients 12 years of age and older were stratified according to vaccine declination, series initiation, and continuation towards series completion. Among patients 12-years-old and above, 26.9% declined the vaccine. Data was not collected to

examine if it was their first attempt at vaccination or the initial attempt to vaccinate. 34.3% of patients 12-years-old or older initiated the vaccine at their encounter during the project implementation period, and 38.8% received a second or third vaccine towards series completion.

Table 6. 12-year-olds and Older Same Day Vaccine Acceptance Population (N = 67)

| | Number of patients | % patients |
|---|---|---|
| Declined vaccine | 18 | 26.9 |
| Received initial vaccine | 23 | 34.3 |
| Continued towards series completion | 26 | 38.8 |

The difference in same day vaccination among patients 12- years of age and older based upon the communication techniques utilized was statistically significant ($p < .001$). Among patients 12-years-old and older initiating the vaccine series, 4.3% were given the educational handout alone; 26% were also engaged in motivational interviewing; 30.4% were also engaged in presumptive approach; 39.1% were engaged in both motivational interviewing and presumptive approach techniques with the handout. Among those aged 12 and older who were due to continue the series at the encounter during the implementation period, 61.5% received the educational handout without additional communication techniques. Of the patients aged 12-years-old and older who declined the vaccine 42.8% were given the educational handout and engaged in both motivational interviewing and presumptive approach communication techniques.

Table 7. Same Day Vaccination Status by Communication Technique Utilized for Patients 12-Years-Old and Older
Population (N = 67)

| | Received Educational Handout Only (%) | Received Educational Handout and Motivational Interviewing (%) | Received Educational Handout and Presumptive Approach (%) | Received Educational Handout, Presumptive Approach, and Motivational Interviewing (%) | Total (%) |
|---|---|---|---|---|---|
| Declined Vaccine | 4 (5.9) | 1 (1.5) | 4 (5.9) | 9 (13.4) | 18 (26.8) |
| Received Initial Dose | 1 (1.5) | 6 (8.9) | 7 (10.4) | 9 (13.4) | 23 (34.3) |
| Continuing towards Series Completion | 16 (23.8) | 0 (0) | 7 (10.4) | 3 (4.5) | 26 (38.8) |
| Total | 21 (31.1) | 7 (10.4) | 18 (26.8) | 21 (31.3) | 67 (100) |

*P* <.001
*p values derived from Chi Square testing

## Discussion

The primary outcome measure of the quality improvement project, HPV vaccination rates, increased from the pre-intervention rate of 55% to a post-intervention rate of 76.4%. When compared to pre-intervention vaccination rates over the same three-month period the preceding year, only 31% of eligible patients accepted same day vaccination from January 2022 to April 2022 (H. Gould, personal communication April 10, 2023). According to outcome

measures, vaccination status and race, insurance type, and communication technique used for patients in both the 11-years of age and 12-years of age and older cohorts demonstrated statistically significant relationships. A lack of statistical significance for the primary outcome of same-day vaccination alongside recognized clinical significance suggests important areas for future project design and analysis.

**Differences in Vaccination Status and Demographics Factors**

There were significant differences in HPV vaccination rates by race. Patients of non-White race were more likely to accept same day vaccination than their White counterparts (93.8% and 67.8%, respectively). A larger sample size could further stratify non-White patients to better identify important differences among racial groups in acceptance of same day HPV vaccination.

Same day HPV vaccination acceptance was significantly related to the patient's insurance type. Patients who were Medicaid managed patients, eligible to receive vaccines through the VFC Program, were more likely to accept vaccination than patients with private insurance (88.6% and 64.4%, respectively). Insurance type is an accepted approximation of socioeconomic status, and this finding mirrored expected outcomes. The higher percentage of Medicaid managed patients accepting the vaccine suggests patients of lower socioeconomic status are more inclined to accept the HPV vaccine. This is consistent with other findings in the literature, where socioeconomic factors such as living in poverty, having public insurance, and being eligible for the VFC program, all increase the likelihood of accepting the vaccine (Mansfield et al., 2020).

The relationship between vaccination status and patient sex was not statistically significant, with males and females achieving vaccination rates of 47.2% and 52.8%, respectively. When discussed with the providers involved in the study after the data collection period was complete, it was felt that it was subjectively more difficult to reach vaccine acceptance with parents of males than those of females. This does not appear to be reflected in the data. In this case, a lack of statistical significance is of paramount clinical significance, suggesting that vaccination rates are starting to equalize between the sexes, when historically HPV disease and the need for vaccination were predominantly viewed to be female health concerns. The educational handout created for the project spoke to the risk factors for both males and females, outlining the gender specific disease processes and cancers that could arise from HPV. In discussing these data, the providers speculated if the educational handout, in addition to the plethora of other public health initiatives around HPV and the HPV vaccine, has contributed to reducing the differences in vaccination rates between the sexes.

**Differences in Vaccination Status by Patient Age**

Patient age was significantly related to vaccination status when stratified between patients 11-years of age, the age at which vaccination is first recommended, and all patients 12-years of age and older. During the project implementation period, 86.4% of 11-year-old patients accepted the initial dose of the HPV vaccine. For these participants, the initial recommendation for vaccination was completed using the educational handout and either motivational interviewing or presumptive approach communication techniques. At this age, the use of both motivational interviewing and presumptive approach communication techniques

were not needed, and overall, acceptance was generally reached without use of all interventions.

Vaccine acceptance without employing multiple methods of communication during the initial recommendation at 11-years of age may be explained by parents effectively engaging in shared decision making with their provider. As previously discussed, shared decision making inherently incorporates concepts and practices of both motivational interviewing and presumptive approach communication techniques used in this project. Effective communication through exclusive use of presumptive approach language or exploration of beliefs and preconceptions about the vaccine through motivational interviewing appear to be sufficient at the initial recommendation for most patients who accepted same day vaccination.

Vaccination acceptance for patients 12-years of age and older was markedly different than at 11-years of age. 26.9% of patients at 12-years and older declined the vaccine, 34.3% received their first dose, and 38.8% received their second or third dose, continuing towards series completion. Vaccine acceptance was significantly related to the type of communication technique used.

Of those participants 12-years of age and older who declined, 50% of those declinations were counseled with motivational interviewing, presumptive approach language, and the educational handout all together. At 12-years of age or older, parents may have been previously counseled to accept the vaccine and subsequently declined, significantly changing their attitude and perspective coming into the visit and the repeated recommendation. The

data suggest that even when all communication techniques are employed, parents of older children eligible for the vaccine may be more hesitant to accept same day vaccination.

Of the 34.3% of participants 12-years of age and older who accepted the initial dose of the vaccine, there was similar use of each exclusive technique - 26% used motivational interviewing alone to achieve same day vaccination, and 30.4% accepted vaccination through use of presumptive speech alone. This can be compared to patients 11-years of age who accepted the initial dose of the vaccine. For patients 11-years of age who accepted the initial dose, motivational interviewing was used in 47.3% of encounters, and presumptive approach was used in 42.1%. This may suggest that under certain circumstances, parents of children 12-years old and older may behave similarly to those of 11-year-olds when offered the initial dose of the HPV series.

Of the patients 12-years of age and older who accepted the initial dose of the vaccine, 39.1% required both motivational interviewing and presumptive approach language to achieve same day vaccination. There are a few possible circumstances to explain these data. A 12-year-old patient whose parent previously refused the vaccine at the 11-year well child check will most likely require the use of both motivational interviewing and presumptive approach language, in addition to the educational handout. The 12-year-old patient who previously missed their 11-year well child check and is receiving the recommendation for vaccination for the first time may require interventions more consistent with what was seen with patients at the 11-year well child check receiving the recommendation for the first time.

Data was not collected on whether the patients 12-years of age and older had previously received any recommendation for the HPV vaccine. Patients 12-years of age and older may have been counseled to accept the vaccine at a previous well child check. If they had previously been counseled to accept the vaccine and are still unvaccinated at the time of the visit during the project intervention period, they must have declined the vaccine. The alternative is that these unvaccinated patients in the 12-years of age and older cohort may have missed one or more annual well check and had never received a recommendation for vaccination. Looking through the EHR, it is easy to identify patients who were seen for the 11-year well child check, but discrepancies in provider documentation may make it difficult to discern whether the recommendation for vaccination was made and not accepted, even if it is considered routine care at 11-years of age.

Differentiating between patients who had been previously counseled to accept vaccination versus their same aged counterparts who had never received a recommendation for vaccination holds paramount clinical significance. The statistical and clinical significance of vaccination status in relation to communication technique used for patients 12-years of age and older may be influenced by previous vaccine counseling. The data and provider opinion suggest patients who have never been counseled to accept the HPV vaccine may be more amenable to the recommendation and more likely to accept same day vaccination. At the initial recommendation, parents or patients may not have preconceived ideas or beliefs about the vaccine and may inherently require fewer interventions to reach the goal of same day

vaccination. The participating providers agree that patients whose parents previously declined the vaccine require more communication techniques to achieve same day vaccination.

**Impact of Different Communication Techniques on Vaccination Acceptance**

When used exclusively, neither added communication technique (motivational interviewing or presumptive approach) significantly impacted vaccination status. Even if lacking statistical significance, a lack of difference between the individual techniques was of paramount clinical significance. The participating providers agreed the educational handout, which was given to every family as a precursor to using other methods, seemed to be the most influential communication modality in solidifying the parents' decision about vaccine acceptance. The educational handout was given to the patient or parent before the provider had the opportunity to employ either of the other communication techniques. The providers agreed the other techniques, in addition to the educational handout, may not have always been completely necessary in achieving vaccine acceptance, that the educational handout alone may have been sufficient. It is thought the handout served as a tool to prevent parents from engaging in the phenomenon of othering.

Othering is a phenomenon by which people stratify themselves as being innately different than or exempt from the same risks or conditions as others (King, 2022). Othering appears in many different arenas throughout healthcare and is thought to be perpetuated by fear and uncertainty, as well as differences among a multitude of demographic factors and inequities, which allow people to subscribe to ideas of "group membership" (King, 2022). Othering has been well documented in the realm of HPV and HPV vaccination, with many

people believing they are inherently not at risk of HPV disease, grossly underestimating the prevalence of HPV disease in their community and overestimating their ability to prevent disease without being vaccinated (Sundstrom et al., 2019). These inequities unconsciously trickle into the delivery of healthcare, allowing parents and patients to believe they are not susceptible to HPV and HPV related cancers, that these health concerns only happen to other children - not their own. When parents and patients were confronted with accessible and user-friendly information about HPV and the vaccine, it removed their ability to displace that risk onto someone else.

The participating providers generally agreed if the educational handout alone was not enough to achieve vaccine acceptance, presumptive approach would next be used, unless the provider sensed heavy hesitancy, in which cases motivational interviewing may be employed before presumptive approach. Provider ability with each technique, especially motivational interviewing, was discussed as a possible factor leading to a lack of significant difference. Motivational interviewing is a learned skill, and not all providers have equal skill. If not properly utilized, the provider's questions may come across to parents and patients as condescending or leading. The differences in the skill with which motivational interviewing is employed may have a significant impact on vaccine acceptance. In future projects, pre-intervention assessment of the provider's skill with motivational interviewing, and appropriate educational means to assess any gaps in knowledge or practice, may be useful in discerning if there is a true lack of statistical difference between the effects of using motivational interviewing and presumptive approach techniques.

## Conclusion

This quality improvement project has demonstrated statistically and clinically significant methods and considerations to improve HPV vaccination rates in the pediatric primary care setting. This project is easily translated into any pediatric primary care setting, as it is low in cost and requires little training and changes to workflow for clinical staff and providers. The primary investigator will also submit a poster abstract to the National Association of Pediatric Nurse Practitioners' 2024 National Conference to communicate with providers across the US about ways to improve HPV vaccination rates.

There are a few factors related to project design to consider when repeating this quality improvement initiative. While this project was limited in size, a larger project of similar design would be of great use to determine how to better tailor the HPV vaccine recommendation to specific pediatric populations. In review of this project, there are several metrics to be reconsidered, including further stratification of patients to identify those who have had a previous recommendation for vaccination, which may provide outcomes with greater clinical significance. Post-intervention surveys relating to parent and patient perceptions of the communication techniques used should be considered. Post-intervention survey results could be of great clinical importance, helping providers to recognize and employ communication techniques best received by their patients and their families.

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## Appendix A

## Provider Intervention Use Log

| Date | Provider | Patient Initials | Motivational Interviewing | Presumptive Approach | Educational Handout |
|---|---|---|---|---|---|
| Ex. 01/09/2023 | Carper | SC | x | x | x |
| | | | | | |
| | | | | | |
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**Appendix B**

**Pre-Intervention Survey**

# HPV Vaccine Declination Survey

This survey is anonymous and completely voluntary. Choosing not to complete this form will not influence the care you and your child receive. This survey is designed to help us better understand your family's needs and beliefs regarding the Human Papillomavirus (HPV) vaccine. You are being offered this survey because you chose not to vaccinate against HPV today.

1. In your own words, please briefly tell us why you chose not to vaccinate against HPV today:

2. Do you believe the HPV vaccine is safe?
    a. Yes
    b. No

3. Do you believe the HPV vaccine is effective at reducing your child's risk of developing HPV related cancers later in life?
    a. Yes
    b. No

4. Would you be interested in reading or watching more information about the HPV vaccine?
    a. Yes
    b. No

5. Once you told your healthcare provider that you were not interested in having your child vaccinated today, did they attempt to engage you in conversation regarding your decision?

a. Yes
b. No

## Appendix C

## Project Timeline

| **Dates** | **Activity** |
|---|---|
| August 22, 2022 | Start of pre-intervention survey distribution |
| October 22, 2022 | Conclusion of Pre-intervention survey distribution |
| November 17, 2022 | DNP Project Proposal Defense |
| December 2, 2022 | Institutional Review Board Submission |
| December 2, 2022 | Provider instruction on intervention techniques |
| January 3, 2023 | Session to discuss changes to workflow with clinical staff |
| January 6, 2023 | Pre-Intervention HPV vaccination rate measurement, demographic data collection |
| January 9, 2023 | Start of data collection |
| February 10, 2023 | Provider and Clinical Staff meeting to discuss progress |
| February 22, 2023 | Middle of Intervention HPV vaccination rate measurement |
| March 10, 2023 | Provider and Clinical Staff meeting to discuss progress |
| April 10, 2023 | End of data collection |
| April 11-28, 2023 | Post-intervention HPV vaccination rate measurement, data analysis |
| July 26, 2023 | DNP Defense |

**Appendix D**

**Educational Handout**