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Improving Human Papillomavirus Vaccination Rates Among Kentucky Adolescents

Submitted in Practical Fulfillment of the Requirements for the Degree of Doctor of Nursing
Practice at the University of Kentucky

By
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Lexington, KY
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Abstract

Background: The Human Papillomavirus (HPV) is a significant factor associated with the development of HPV-associated cancers in the United States. The administration of the HPV vaccination is a critical prevention strategy in reducing HPV-related cancers in the United States. The state of Kentucky has lower than average HPV vaccination rates compared to the national average. There is a significant amount of evidence exploring barriers and facilitators of the HPV vaccination administration. There are several multi-level barriers associated with low uptake of the HPV vaccination in adolescents. Multiple sources of evidence have indicated that parents who receive a provider recommendation are much more likely to receive the HPV vaccination.

Purpose: The purpose of this project is to assess the effectiveness of an educational intervention on health care provider's understanding of the importance of their own vaccine recommendations to adolescent families to improve HPV vaccination rates.

Methods: This is a quasi-experimental pretest–posttest design. The sample includes medical providers and clinical staff of the University of Kentucky Adolescent Medicine Clinic. Participants completed a pre-survey, an educational quality improvement (QI) session, and post-survey derived from an evidence-based HPV IQ toolkit from the University of North Carolina Gillings School of Public Health. Likert scales were used to analyze provider and clinic staff attitudes before and after the session, perceived importance of components of the session, and to evaluate the change in provider attitudes before and after the session. A paired t-test was used to compare provider attitudes before and after the QI session. Clinic HPV immunization rates of 13-year-old males and females were collected from the Kentucky Immunization Registry before the project implementation and three months following the QI session.

Results: A total of 13 participants completed the pre-survey and the QI education session in November of 2020. A total of 11 participants completed the post-survey. During the post-survey, participants completed an evaluation of the QI program, which demonstrated overall positive attitudes of providers and clinic staff surrounding the HPV vaccination before the session and improved attitudes after the session. In the three months following the educational intervention, completion of at least one HPV vaccination documented improved from 81% to 86% of UK Adolescent Medicine 13-year-old patients.

Conclusion: A gap exists between national recommendations and HPV vaccination completion rates in adolescents due to multiple factors in the United States. Following a QI session, improvement was observed of 13-year-old male and females HPV rates and strength of attitudes of medical staff strength within UK Adolescent Medicine. Although results lacked statistical significance, this study highlights an individual clinic's ability to obtain tools necessary to set goals, implement evidence-based practices, and improve patient outcomes. Further large participant multi-level evidence-based interventions are recommended.

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I would like to recognize my advisor, Dr. Karen Stefaniak for her encouragement throughout the DNP program. Her guidance and instruction have deeply altered the path of my professional and personal life. Her consistency and clarity are stabilizing to her environments. Dr. Stefaniak has an elegant way of approaching the joyful and painful experiences of life. She was the first professor to provide tools to view situations from many different perspectives. She has taught me that beauty can lie within the sorrow of death and that opportunity can be found within perceived failures. Dr. Stefaniak's resilience is so present that it is nearly unrecognizable.

There are truly not enough words to describe the women that make up my DNP committee. There isn't one committee member who hasn't profoundly influenced my life. In the time that I've known each of them, they've supported my growth, their patient's growth, their student's growth, their practice's growth, and their growth. I can recall a time where each one of them has forced me to think outside of my box. Their voices hold passion and their stories inspire. They are professionals, wives, mothers, daughters, friends, and sisters. Dr. Emily Messerli, committee member, has empowered me to remain curious and encouraged me to be centrally involved in multi-level changes which improve patient outcomes. Dr. Mandakini Sadhir, clinical mentor, has been a grounding force and a strong advocate in my professional and academic life. She has challenged me to increase my knowledge, improve workplace practices and encourage evidence-based strategies to be utilized to improve care to adolescents. Dr. Morgan Chojnacki, committee member, has always used her voice to organize people, structures, and ideas into tangible changes. She has taught me to use my voice and I am very grateful University of Kentucky College of Nursing Undergraduate students will recognize early on the importance of making their voices heard.

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Dedication

This project is dedicated to my grandmother, Madeline Arena. She passed away in July of 2020 in Chalmette, Louisiana. My grandmother had a gift of knowing whether a situation required elements of challenge or support in her interactions with others. Her intentionality provided a source of stability, safety, and growth to others. She had a way of gently questioning the conduct of her surroundings that could compromise the wellness of herself or her loved ones. For example, in June of 2020, while admitted into an inpatient facility in New Orleans, Louisiana, a nurse walked into her room with no mask on her face. Before the young woman stepped another foot into her room, my Grandmother Madeline simply asked, “Where’s your mask?” She didn’t see a need in raising her voice or even kindly reminding the nurse of the global pandemic amongst us. After my grandmother posed her question, the nurse left the room and returned with a mask on. Despite being by herself during her stay, she continued to use her voice to improve the systems in which she resided. Her voice was gentle but steady and powerful, especially in the midst of difficult conversations. My Grandmother Madeline represents one of the many unseen heroes who bravely sacrificed the comfort of hugs, visits, and normalcy since the beginning of the COVID-19 pandemic. This month of March 2021 marks one year since the first case of COVID-19 was documented in states like Kentucky on March 6th and Louisiana on March 9th 2020. This project is also dedicated to the unquantifiable amount of people who were lost and who experienced loss in this difficult year.

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Background and Significance

The Human Papillomavirus (HPV) is a significant factor in the development of cervical cancer, contributing to approximately 31,500 HPV-associated cancers in men and women in the U.S. each year (CDC, 2018). HPV is linked to 90% of cervical and anal cancers, 60% of penile cancers, and 70% of vaginal, vulvar, and oropharynx cancers (CDC, 2018). Cervical cancer is the second leading cause of cancer in women worldwide, and the most common HPV-associated cancer in the female population (CDC, 2018). There have been several public health interventions to mitigate the impact of cervical cancer, including a primary prevention strategy: vaccination. The United States has had access to a vaccination to protect the population from HPV-related cancers since 2006, but it is one of the most under-utilized vaccines recommended by the Centers for Disease Control's Advisory Committee on Immunization Practices (ACIP). The ACIP recommends that middle school students receive one HPV vaccination with their scheduled 11-year-old immunizations and another vaccination after 6 months of the first vaccination. According to Walker et al. (2017), far fewer U.S. adolescents receive the CDC-recommended HPV vaccine than other vaccines mandated by individual states. Approximately 88% of children entering 6th grade receive the Tdap booster that is required for school entrance; in contrast, only 56-65% of adolescents receive a single dose of the HPV vaccination, with only 43.4% completing the HPV series (Walker et al., 2017).

There is limited transparency concerning HPV immunization rates as compared to other childhood immunizations. The CDC publishes immunization rates from each school to create accurate immunization reports by region. Although the HPV vaccination is recommended by the ACIP, the completion of the 2-dose vaccination series is not mandatory for school entry in Kentucky. HPV vaccination data are not reported to the state annually from school systems; they

are only reported through annual phone interviews administered by the CDC. Consequently, nationally collected data does not reflect community level HPV rates. Rates of the HPV vaccinations are unable to be visualized at a community level, leading to difficulty in improving focused improvement processes. According to a CDC NIS-Teen survey of approximately 300 adolescents in 2017, Kentucky's effort at increasing HPV vaccination rates has been poorer than the nation's average (Walker et al., 2017). Of children in Kentucky between the ages of 13-17, only 37.7% (US: 49%) have completed the HPV vaccination series and only 49.6% (US: 65.5%) had coverage with at least one dose of the vaccination (Walker et al., 2017). The NIS-teen survey assesses multiple demographic characteristics to predict the status of whether a HPV vaccination was completed including: sex, mother's education level, whether they've had an 11 or 12 year old annual exam, a provider recommendation of the HPV vaccination, and guardian's intent to receive an HPV shot in the next 12 months. Analysis of CDC data observed that one of the most important factors associated with adolescents receiving the HPV vaccination was receiving a recommendation from their provider (Rahman et al., 2015). In addition to improving provider's ability to recommend the vaccination, evidence suggests that multi-level strategies that are sensitive to the needs of patients, providers, organizations, and systems assist in improving HPV initiation and completion rates (Lu et al., 2019; Dilley et al., 2018; Carhart et al., 2018).

Data must be transparent for systems to methodically develop goals and improve outcomes. In the last decade, several states have supported the creation of electronic immunization registries to accurately store health information that can be easily accessible to primary care offices. The Kentucky Immunization Registry (KYIR) is a computer-based repository and tracking system which was implemented by the Kentucky Department of Public

Health (KYIR, 2020). This program was initiated in 2009 and data is growing over time on adolescent vaccinations. This system provides for the sharing of immunization information among authorized users, though it is not mandated that medical facilities administering vaccinations record data into the registry; therefore, this online portal harbors incomplete records of vaccination administration that could be used for tracking purposes. Public health initiatives are often complex and require multiple levels of intervention to improve long-term outcomes. This project will help fill the knowledge gaps around known barriers associated with low HPV rates in Kentucky adolescents.

Purpose

The purpose of this project is to assess the effectiveness of an educational intervention on health care provider's understanding of the importance of their own vaccine recommendations to adolescent families to improve HPV vaccination rates. The four aims of this project included:

1. To provide education for UK Adolescent Medicine Clinic medical providers and clinical staff with a virtual HPV Quality Improvement Session through use of evidence-based HPV IQ quality improvement tools.
2. To analyze provider and staff confidence and attitudes surrounding HPV vaccination practices before and after a quality improvement session.
3. To compare Kentucky Immunization Registry data of 13-year-old male and female UK Adolescent Medicine patients with one valid HPV vaccination on 11/9/2020 and 2/9/2021.
4. To evaluate medical provider and clinical staff evaluations of the QI program.

Conceptual Framework

The theory of planned behavior (TPB) guided this project. The theory states that behavior modification depends on an individual's motivation and abilities. TPB can be used during the implementation of process changes to achieve positive outcomes (Batista et al., 2015). The planned behavior defined in this project is a provider recommending the HPV vaccination. The theory explains that three general constructs which guide human behavior. The first construct includes is the attitude of the behavior, and whether one thinks this particular behavior makes sense for them. The second construct is the subjective norm. This includes everything around the individual such as cultural or group beliefs. The third construct is perceived behavioral control, which expresses how easy how hard it is to display a behavior or act a certain way. The theory of planned behavior forecasts that a positive attitude the behavior, a favorable social norm, and a high level of perceived behavioral control are the best predictors for forming a behavioral intention which lead to a displayed behavior. In short, if individuals think a behavior is a good idea, everyone else thinks it is a good idea, and it can be carried out successfully, then the intention will exist for a behavior to be carried out. However, if one construct is unfavorable, then one is less likely to behave in the planned way. Behavioral beliefs tend to produce a favorable or unfavorable attitude toward a behavior and guide the consideration of positive and negative outcomes. Each of these beliefs influences the intention of an individual before making a new decision. Each defined aim can be associated with TPB.

Historically, immunizations have been developed to mitigate the impact of life-threatening medical illnesses. The HPV vaccination was one of the first immunizations to address a chronic health issue: cancer. The HPV vaccination was presented to the healthcare market in 2006 making it the newest CDC-ACIP recommendation, and one of the only

vaccinations that is not mandatory for school entry. A common clinic scenario can help explain the TPB. A parent brings a child in for mandated vaccinations because they received a letter from the school notifying them of due vaccinations before school entry. If the parent presents to a clinic asking their child to receive the list of necessary vaccinations that do not include the HPV vaccination (parental subjective norm construct), a provider will choose to recommend the HPV vaccination in addition to what a parent may request (provider attitude of the behavior). In this situation, a provider may or may not decide to ask a parent to accept the HPV vaccination in addition to other vaccines. Before carrying out the behavior, a provider may be concerned with the positive or negative consequences that may come from having a conflict with a family member if they are vaccine-hesitant (provider attitude of behavior). In this situation, a parent may respond that they don't want their child to receive the vaccination. A provider may be concerned about whether they have the tools, confidence, and knowledge to carry out the new behavior (perceived behavioral control).

The intervention within this project provides dialogue and approaches to carry out the behavior. Aim 1 seeks to give providers the communication tools to have conversations with family members. Aim 2 will aid in recognizing general beliefs and attitudes and establishing a subjective provider norm surrounding the HPV vaccination in the Adolescent Medicine Clinic. Aim 3 will evaluate the efficacy of the intervention and an example of a tool to utilize which can influence provider perceived behavioral controls. Aim 4 will provide data to the primary investigator of the study on perceived behavioral control. The three attitudes of the TPB formulate a person's intention before executing a behavior change. When there are varying levels of social acceptability of a behavior, the TPB may be utilized to target several types of barriers associated with lack of change towards a positive health behavior (Batista et al, 2015).

The theory of planned behavior was utilized throughout this project to provide medical staff with the appropriate knowledge, understanding, confidence, and tools needed to carry out successful implementation. The literature review provides multiple examples of TPB constructs which influence provider behaviors.

Review of Literature

The purpose of this literature review was to explore health care provider barriers associated with recommending the HPV vaccine to adolescents. An electronic search was conducted using the databases Medline, PubMed, CINAHL, and Web of Science. The initial search of evidence resulted in approximately 79 peer-reviewed articles, of which 20 met inclusion criteria. These criteria included peer-reviewed publication in English between 2009 and 2019. Search terms: human papillomavirus, adolescents, vaccination, vaccine, barriers, provider barriers, provider perceptions, recommendations.

The review of evidence revealed several examples of provider-perceived barriers to recommending the HPV vaccination. Providers are considered individuals who is licensed to practice and bill for services, such as a physician, physician assistant, or nurse practitioner. There are various obstacles cited in the literature at the parent-child, interpersonal, community and policy levels, contributing to poor uptake of HPV vaccination (Carhart et al., 2018). Several studies found that interventions that improve clinician attitudes may reduce missed opportunities of administering the HPV vaccine (Rosen et al., 2018; Cunningham-Erves et al., 2019; Dilley et al., 2018). Providers in private practice areas reported barriers associated with vaccine ordering, stocking costs, reimbursements, and insurance coverage compared to those in public settings. Offices accepting public insurances receive HPV vaccination stock through federally funded programs. Many private offices elect to not purchase HPV vaccination stock due to concern of

expiration and lost revenue if parents refuse the vaccination. Perceived provider barriers regardless of a public or private setting included perceived parental concerns about safety, age of the child, low risk of infection of the child through sexual activity, and mistrust in vaccinations (Cunningham-Erves et al., 2019). These provider perceived parental HPV hesitancies were associated with provider self-efficacy, outcome expectations, and confidence in HPV safety (Cunningham-Erves et al., 2019). System barriers reported by providers included the nature of the HPV dosing schedule, poor tracking systems, and lack of school-based vaccination requirements (Tom et al., 2016; Dilley et al., 2018).

Providers acknowledge that there is no single reason a parent refuses to vaccinate their child with the HPV immunization (Garbutt et al., 2018). One evidence-based strategy positively influencing a parent's decision to vaccinate the HPV vaccination is motivational interviewing. This interviewing technique improves provider's communication with parents who are HPV vaccine-hesitant (Reno et al., 2018). Motivational interviewing is a guiding style of communication, which utilizes methods such as "change talk" to reinforce intrinsic motivation in individuals (Garbutt et al., 2018). There is minimal research relating to motivational interviewing and increasing HPV vaccination rates (Reno et al., 2018). Much of the research surrounding motivational interviewing has assessed its impact on adult populations. In addition to specified techniques, several studies supported education and skill-building communication of providers and families to increase HPV vaccination rates (Lake et al., 2019; Tom et al., 2018). Training tailored to address barriers in specific regions helps improve HPV vaccine rates (Javaid et al., 2017; Holeman et al., 2014; Dilley et al., 2018). Providers desire training on how to discuss individual concerns with parents about the HPV vaccination (Fleming et al., 2018). Providers prefer facility-based and web-based training methods (Fleming et al., 2018; Kumar et al., 2019).

Although it is apparent that a provider recommendation is a critical factor in HPV vaccine completion for adolescents, multi-level strategies, such as standing orders, provider reminders, clinic flow alterations, and system-level interventions would be effective in allowing providers the support for vaccine recommendation (Lu et al., 2019).

The literature reviewed suggests several gaps contributing to the reduced frequency of providers recommending the HPV vaccination. Training methods are needed to address concerns of providers regarding communication (Reno et al., 2018). Healthcare systems could provide support to medical staff to eliminate barriers to recommending the HPV vaccination (Eddens et al., 2017). Approaches such as borrowing quality improvement programs and strategic planning practices are informing thoughtful process changes within institutions (Wilburn et al., 2016). A more thorough investigation on training methods and their efficacy would help support medical providers' need for communication skills (Reno et al., 2018, Gilkey et al., 2016).

Methods

Design

The study design is a quasi-experimental pretest–posttest design that did not include a control group. The pre-survey, post-survey, and vaccination data were entered into the SPSS statistical program for analysis. Internal data were collected and a paired t-test was used to test for differences in the data set. The data collected for this study were then analyzed by using descriptive statistics through SPSS software.

Setting

The setting for this study was the University of Kentucky Department of Pediatrics, Division of Adolescent Medicine. The population of this survey included the provider and clinic

staff at the University of Kentucky Department of Pediatrics, Division of Adolescent Medicine, and adolescents thirteen years of age with an active Kentucky Immunization Registry. The providers that make up this primary care clinic include four physicians, three nurse practitioners, and one physician assistant. Clinic staff includes nurses, medical assistants, and patient care technicians. The primary population served in the UK Adolescent Medicine Clinic are adolescents aged 10-25 from the Central Kentucky area. Since May of 2020, the clinic has provided approximately 50% telemedicine visits and 50% in-person medical visits. The Adolescent Medicine Clinic is considered a primary care clinic and adolescent specialty clinic and serves approximately 4,000 urban and rural adolescents annually. In the University of Kentucky Department of Pediatrics, there are no standardized methods in which clinic staff can visualize initiation of one or series completion rates of the HPV vaccination.

DNP Project Congruence

The University of Kentucky Healthcare system includes inpatient and outpatient services. The University of Kentucky's Chandler Medical Center is an Academic Level 1 Trauma Center. The University of Kentucky, Department of Pediatrics, Division of Adolescent Medicine is a research facility and clinical site providing primary and specialty care to a diverse group of patients on an outpatient basis. UK HealthCare has five DIRECT values to aid in actions, behaviors, and decision-making within the work environment. These include: diversity, innovation, respect, compassion, and teamwork. UK HealthCare is committed to academic health care – research, education, and clinical care. UK Healthcare's vision is to achieve national recognition as a Top 20 public academic health center and provide advanced and multidisciplinary health care to Kentucky and surrounding areas.

Description of Stakeholders

There are a variety of stakeholders found within this project setting. These include The Division of Adolescent Medicine, The Department of Pediatrics at the University of Kentucky, and UNC Gillings School of Public Health. The Division of Adolescent Medicine is the physical clinic where the study was conducted. Its location is at the Kentucky Clinic, an ambulatory setting within the University of Kentucky. It is a division of the Department of Pediatrics. The University of Kentucky's Department of Pediatrics has been providing service and education through the University of Kentucky (UK) College of Medicine since 1961. UK's College of Medicine's most recent strategic plan is divided into five pillars. These pillars include Clinical Care, Education, Community Engagement, Diversity and Inclusivity, and Research. UNC Gillings School of Global Public Health is an entity offering publically HPV quality improvement tools without permission. These established tools were utilized to implement a quality improvement session at UK Adolescent Medicine through the HPV IQ materials and methods. These materials were tested in the field with seven state health departments. There was funding provided by the Robert Wood Johnson Foundation for the HPV IQ website and the Assessment and Feedback Tools research.

Facilitators and Barriers of Implementation

Academic sites are often open and receptive to evidence-based trainings and research collection, which was a facilitator of project implementation. Collaborating with site leadership representatives to coordinate and reserve time to deliver education and allow feedback was a barrier. It was necessary to schedule activities well in advance to ensure providers and staff were able to attend sessions.

Sample

- A. Adolescent Medicine Clinic Providers and Staff: The population selected was medical and clinical staff from the UK Adolescent Medicine Clinic in Lexington, KY. The sample of this study included medical providers (MD, DO, NP, PA) and clinical staff (registered nurses and certified medical assistants) at the University of Kentucky Department of Pediatrics, Division of Adolescent Medicine. Inclusion criteria were all part-time or full-time medical providers and clinic staff assigned to the Division of Adolescent Medicine. Exclusion criteria: professional students assigned to any medical providers
- B. Patient population: A sample of adolescents was collected from UK Adolescent Medicine Clinic. These data did not include any identifiable patient information. The de-identified data were extracted by a representative from the Kentucky Immunization Registry team. Inclusion criteria: Male or female aged 13 with an active status in the Kentucky Immunization Registry.

Procedure

This project was approved by the IRB on October 20, 2020. IRB Approval #62686 was entitled "Improving Human Papillomavirus Vaccination Uptake among Kentucky Adolescents through Provider Education." Open source tools were used from the University of North Carolina (UNC) School of Public Health for this project. The HPV IQ Assessment and Feedback Toolkit's goal is to raise HPV vaccination coverage across the United States. The toolkit provided several resources that are of no cost to users and publicly available, including standardized scripts and evaluation tools (Brewer et al., 2020). The toolkit provides a standardized approach to address vaccine hesitant parents with the "Announcement Approach

Training.” Tools educate providers on presumptive announcement approaches and communication techniques to address common parental concerns. The HPV IQ Protocol was developed with the CDC and many state health departments and designed to complement the CDC’s AFIX model and existing state health department plans in Arizona, Illinois, Michigan, New York, North Carolina, Washington State, and Wisconsin (Brewer et al., 2020). Provider-education tools which have recently been developed have not been externally validated.

According to the UNC School of Public Health representatives, since 2016, this training method has been provided to approximately 1375 healthcare workers. In addition, the National Cancer Institute designated it as a Research-Tested Intervention Program, and the CDC and American Academy of Pediatrics endorses use of presumptive announcements when recommending HPV vaccine. I was personally trained in a session hosted by the University of North Carolina Public Health Program Announcement Approach during a California HPV Roundtable Train-the-Trainer Event.’ These tools include:

1. Pre-survey: evaluated providers’ beliefs and practices about HPV vaccination before the 60-minute virtual quality improvement (QI) session
2. Training session script for educational quality improvement session
3. Training slides to present material from training script
4. The announcement approach handout exercise
5. Post-survey: measured providers’ beliefs and practices about HPV vaccination, perceived importance of components of the QI session, and evaluation of satisfaction of

the QI program directly following the quality improvement session for comparison to the results of the pre-survey.

The Quality Improvement training session was completed through a scheduled 60-minute virtual session during a scheduled staff meeting with UK Adolescent Medicine medical providers and nursing clinical staff. Pre and post-surveys were collected and analyzed to evaluate changes in provider perceived confidence and attitudes in quality improvement activities and improving HPV vaccination rates. Fifteen minutes were allotted for each of the surveys to be administered before and after the quality improvement session.

The HPV IQ toolkit encourages practices to utilize state immunization information systems (IIS) to collect data on clinic vaccination rates. Kentucky's system is the Kentucky Immunization Registry (KYIR). Each clinic in Kentucky has an identifier number to determine the physical location of immunization administered. HPV vaccination rates were collected on thirteen-year-old males and females assigned to the University of Kentucky Adolescent Medicine Clinic who have had at least one vaccination documented in the KYIR. The Adolescent Medicine Clinic Kentucky Immunization Registry identification number was used to collect HPV immunization rates by a third-party representative. This vaccination data were measured before and three months post-intervention to compare HPV rates. All quantitative data were analyzed using descriptive statistics. Procedure steps included:

1. The Division of Adolescent Medicine within the Department of Pediatrics of the University of Kentucky provided a letter of support.

2. The Division Chief, Practice Manager, and Nursing Leader of the Division of Adolescent Medicine was contacted via e-mail to schedule the administration of the pre-survey, quality improvement session, and post-survey to medical providers and nursing clinical staff. The Quality Improvement Session was offered virtually through a Zoom meeting after the completion of patient care activities of the day. The title of the 60-minute virtual training was “Making Effective HPV Vaccination Recommendations,” from the HPV IQ Toolkit.

3. The PI sent an email to all potential clinic provider subjects explaining the project and requesting their participation. Participation in the study was completely voluntary. Completion of the survey served as consent. Participants could skip any question on the survey.

4. Participants completed a pre-and post-survey which included defined demographics and participant attitudes surrounding the HPV vaccination.

5. A pre-survey was administered to those who volunteered for the study through a URL that was located on the screen via a QR code directly before the start of the quality improvement session. The quality improvement session was completed with a training script and training presentation through the HPV IQ tool kit. A post-survey was administered following the training session through the URL that was given to each participant at the beginning of the session.

6. The education was guided by the processes outlined in the HPV IQ Toolkit

Measures

The assessments participants completed were derived from the HPV IQ Toolkit. The pre-survey included demographic information related to role, years of experience, sex, and ethnicity (table 1). In the pre-survey participants indicated which HPV vaccination strategies they were

utilizing prior to intervention (table 6). Attitudes were measured on a 5-point Likert scale from strongly disagree, somewhat disagree, neutral, somewhat agree to strongly agree (table 2). The pre and post survey assessed elements of provider intention, self-efficacy, and norms. Each participant evaluated the quality improvement and session on the same scale as the attitudes Likert scale (table 4). Participant perceptions regarding importance were measured from not important (1) to extremely important (5) (table 5). Survey data from providers (medical providers and clinical staff) were submitted electronically through REDCap, a secure web application utilized for capturing data for research studies. Data Analysis Statistical Package for the Social Sciences (SPSS) software was utilized in the compilation and analysis of the data that were reported. All data were secured electronically behind the University of Kentucky computer firewall on the PIs password-protected, encrypted, computer. Data practices were followed according to the University of Kentucky's policy, A13-050. A third-party representative from the Kentucky Immunization Registry abstracted aggregate data. No patient identifiers other than age and clinic location were available on this report.

Descriptive statistics including frequency distributions or means and standard deviations were used to summarize study variables. The paired t-test was used to determine the difference in the pre-intervention and post-intervention attitude questions and total summative score. The chi-square test of association was used to determine differences in registry data of vaccination rates between the two time periods. All data analysis was conducted using SPSS, version 25, with an alpha of .05 throughout.

Results

Sample Demographics

A total of 13 participants (table 1) completed the pre-survey, and a total of 11 participants completed the post-survey. Of these participants, 84% were Caucasian and 100% were female. There was a variety of different roles within this study; 31% of the participants were Registered Nurses, 23% were Nurse Practitioners, 23% were Physicians, 15% were Clinical Service Technicians, and 7% were Physician Assistants. Years of experience ranged from less than 5 years to greater than 20 years. Approximately 39% of participants had fewer than 5 years of experience, 31% had 5-9 years of experience, 15% had 10-14 years of experience, and 15% had greater than 15 years of experience. The pre-survey indicated that 77% of participants encouraged providers to routinely recommend HPV vaccine to age-eligible patients and provided educational materials on HPV vaccination to parents and patients.

The pre-survey post-survey Likert scale ranged from strongly disagree (1) to strongly agree (5). “Improving HPV vaccination coverage is an important goal for my practice or clinic” mean increased from 4.54 to 4.91. “Confidence in practice being able to improve HPV vaccination coverage” increased from 4.62 to 4.73. “Confidence in personally being able to improve HPV vaccination coverage” mean had the greatest attitude change from 4.08 to 4.80, which was a statistically significant finding. “HPV vaccination coverage in my practice or clinic is lower than I’d like it to be” negatively changed from 2.85 to 2.27. At the time of the QI session, participants gained the knowledge that rates within this clinic are higher than national and state averages. This likely corresponds to the neutrality of the pre-survey and reduced mean of the post-survey of this attitude. Overall, all attitudes means surrounding the HPV vaccination improved from 16.3 to 16.8 after the QI session with low statistical significance.

The evaluation Likert scale was identical to the attitudes assessment. Participants responded between somewhat agree to strongly agree that the session was convenient, the facilitator was knowledgeable, the content was understandable, and the session would help their clinic to improve HPV coverage. Participants measured important components of the QI session on the Likert scale of not important (1) to very important (5). Data demonstrated that all providers believed all four components were very important to extremely important. Providers and clinic staff demonstrated that the most important components of the quality improvement session were discussing provider recommendation significance and committing to quality improvement strategies to increase vaccination coverage.

In this study, participants were able to provide quantitative and qualitative suggestions for improving the training program that begins to remedy this lack of evidence. One participant suggested that the facilitator “give updated male related cancer prevention stats to use. Parents respond well to numbers, and I know the numbers for cervical cancer reduction, but not penile and anal. Also didn't know about the throat cancers so more on that. Thanks!”

Registry data (table 7) were collected by a third party from the Kentucky Immunization Registry found that 13-year-old vaccination rates improved between November of 2020 to February of 2021. The sample size of 13-year-old male and female in November 2020 was 127 patients, and in February was 118 patients with an active registry within the UK Adolescent Medicine Clinic. Registry data found that approximately 81% of 13-year-old male and females had at least one HPV vaccination administered in November of 2020, and 86% had at least one HPV vaccination administered in February of 2021. Data from both period exhibited an equal distribution of one HPV dose administered of male and female patients.

Discussion

The focus of this study was to analyze provider and clinic staff attitudes surrounding the HPV vaccination, provide evidence-based tools to improve communication between providers and parents, and compare 13-year-olds who have completed at least one HPV vaccination within a University of Kentucky Adolescent Medicine Clinic before and after the intervention. There were minimal differences in demographics of participants with improved attitudes following the intervention. The study size was small and composed of all females. Demographic differences in participants were not associated with attitude changes. Evidence suggests that medical providers understand that there are multiple factors associated with HPV vaccine-hesitant parents, and that there isn't one effective delivery of parental education that is linked to increased HPV rates. Research indicates that providers seek training in building effective communication skills with parents. Evidence supports education models directed toward both health care providers and parents to increase HPV vaccine completion (Widman et al., 2018; Eddens et al., 2017; Dilley et al., 2018). This study did not provide direct parental intervention. However, the focus of the evidence-based intervention was delivering tools to build connections and strengthen communication between providers and parents, filling gaps represented in the literature. The intervention provided by the HPV IQ toolkit delivered evidence-based techniques such as motivational interviewing to medical staff and providers to improve HPV vaccination rates in the Adolescent Medicine Clinic.

Evaluating clinic staff confidence and attitudes helps assess barriers of providers recommending the HPV vaccination to adolescents. Provider attitudes, norms, self-efficacy and intentions were evaluated in this study. The greatest change in pre and post surveys exhibited in the study was the improvement of individual confidence of participants. The HPV IQ Toolkit's

Announcement Approach improved medical provider and clinic staff's self-efficacy.

Participants moved from somewhat agreeing before the QI session to strongly agreeing after the QI session in their ability to influence change on a personal level to improve HPV vaccination coverage. This improved provider efficacy was apparent across all participants, including physicians, physician assistants, nurse practitioners, nurses, and medical assistants. Literature reviewed prior to this project was limited to providers, although multi-disciplinary team sessions with a larger sample size could be assessed in the future. The HPV IQ evidence-based toolkit had limited role demographics within the evaluations. Future research may explore if evidence-based trainings, including multidisciplinary teams exhibit higher efficacy compared to training limited to providers.

Evidence suggested that current training curricula lack adequate evaluation of programs. In this study, participants were able to provide quantitative and qualitative feedback for the improvement of the training program. Quantitative data observed that satisfaction of the training was high. The qualitative suggestion presents an individual knowledge gap of the provider, information on how specific education they would like to acquire, knowledge about parental perception about data. Such input highlights the importance of evaluation practices that can facilitate improvements of education to specific learning environments. During the QI session, clinic medical providers and staff were encouraged that their team provided higher than average adolescent vaccination rates even during the reduction of in-person activity due to COVID-19. Data observed that UK Adolescent Medicine Clinic providers and staff had an overall positive attitudes and self-efficacy. This may be a reflection of their population's higher than average completion rates as well as adolescent-specific population focus. Findings of this study could

suggest that constructs with positive group means including attitudes, norms, self-efficacy, and intentions of the HPV vaccination is associated with higher than average HPV vaccination rates.

Kentucky adolescents have lower than average rates of receiving at least one HPV vaccination compared to others in the United States, but this was not apparent in the UK Adolescent Medicine Clinic based on data collected from the Kentucky Immunization Registry. Attitude assessment indicated that participants had a neutral attitude associated with their perception of clinic HPV coverage. Future pre-surveys could inquire whether medical providers and clinic staff have a standard mechanism of obtaining and distributing CDC recommended immunization data from their population. At this time, there is no standard process for collecting and disseminating data on adolescent vaccination rates in the UK Adolescent Medicine Clinic within their designated electronic medical record system. Participants identified that setting goals and participating in improvement practices were important components of the QI session. Standardizing the use of immunization information systems can be a tool utilized to improve outcomes in clinics throughout Kentucky.

Implications

Literature has indicated that additional research needs to be conducted on how to improve HPV immunization rates at multiple levels of intervention sites. Evidence has suggested that providers seek the tools to discuss the multiple barriers associated with parental hesitation to vaccinate their children with the HPV immunization. At the clinic level, the study showed that the sample of participants had overall positive attitudes regarding HPV vaccination before the quality improvement educational session, and the sample of adolescent patients with active registries was already above the national averages. Following the intervention, there were improvements in attitudes and vaccination rates of the HPV vaccination in both sets of samples.

The study may be used to support future research that aims to evaluate clinic provider and staff attitudes compared to a populations' HPV vaccination rates. Further investigation is needed to recommend whether a similar intervention would have a greater impact with lower baseline attitudes and lower HPV initiation rates. Although the Adolescent Medicine Clinic HPV initiation rates were higher than national averages, the state of Kentucky still has lower than average rates of HPV initiation. A more thorough investigation into HPV vaccination rates in Kentucky clinics should be obtained to locate clinics in need of education. Comprehensive evaluation of training methods and their efficacy would help support medical providers' need for activities with lower-than-average clinic vaccination rates. Specific population, providers, and community system needs must be assessed to address gaps to improve population health.

Developing process improvements can be strengthened through collaboration with outside entities that have dedicated time and energy to developing practice tools. Publicly available tools such as the HPV IQ Toolkit may be implemented to improve patient care across multiple facilities. The utilization of state data registries may provide additional tools to improve preventative practice outcomes without compromising vulnerable population's data. Centralized records could improve safety and practice efficacy in obtaining important medical record data. Since 2020, the Kentucky Immunization Registry Data has published county-level data on 68% of the state's adolescent population. States such as Indiana require all facilities that provide immunizations to report to the Indiana State Vaccination Registry. Disconnected data and tracking practices create difficulty for health care facilities and families to have an understanding of vaccination completion rates. The lack of policy mandates requiring centralized recording of vaccination could be an area of focus in improving Kentucky's HPV vaccination rates. In the future, centralized registry systems could target facilities with poor

HPV rates. Furthermore, individual clinics could use these centralized registry systems to measure quality and set short and long-term practice goals.

Exploring this public health problem sheds light on the complexities of barriers that exist in our healthcare system. The literature found that providers want to improve communication and build on a fundamental connection in health care: the one between the provider and family unit. This study recognizes the significance of not only our connection with the patient's that providers touch, but the relationships we have within our teams to build upon our strengths, and the relationship we have with ourselves. The belief in the self is instrumental in creating changes. Implementation of interventions at these seemingly small levels have the ability to impact an entire population's outcome.

Limitations

This quasi-experimental study had several limitations threatening the study's ability to establish a causal association between the quality improvement intervention and the study's outcome. The study sample was limited by gender and ethnicity. This limited the ability to evaluate whether gender and ethnicity impacted perceptions. The second limitation of the study was a small sample from one setting with only 11 participants in the post-survey responses. Collecting data from a variety of settings would minimize this limitation. The third limitation is that this study was not randomized which threatens the study's internal validity. Another limitation included the scales used in this study. Limitations from the use of Likert scales include the possibility of response bias, subjective interpretation, and choice restriction. As a personal provider within the Adolescent Medicine team, there was a limitation associated with my personal relationship with medical providers and staff within the clinic. Although, this could be considered a strength of study considering participant's perception of the trainer's credibility.

Conclusion

Evidence from the literature review suggests that multi-level strategies that are sensitive to patient, provider, organization, and system need to aid in improving HPV completion rates (Carhart et al., 2018). A gap exists between ACIP recommendations and HPV vaccination completion due to multiple factors, including political, structural, and individual beliefs surrounding the HPV vaccination. This study revealed that the University of Kentucky Adolescent Medicine Clinic had higher than average rates of HPV vaccinations, and providers and clinic staff had positive attitudes of the HPV vaccination. Following the quality improvement session, there was a mean improvement in attitudes and 13-years-old males and females one completed HPV vaccination dose. Statistically significant improvement was observed in individual provider and staff self-efficacy in improving HPV rates. Further studies could involve a larger and more diverse sample to improve validity and reduce limitations. Data transparency of publically available tools and registries could facilitate more efficient quality improvement efforts of community and state level improvement processes. This study observes that quality improvement projects have the potential to empower individuals within a group. The project exemplifies an individual clinic's ability to obtain several tools necessary to set goals, implement evidence-based practices, and improve patient outcomes.

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Table 1 – Demographic Data (N = 13)

Characteristic	n (%)
Race	
White, non-Hispanic	11 (84.6%)
Black	1 (7.7%)
Asian	1 (7.7%)
Role	
Registered Nurse	4 (30.8%)
Clinical Service Technician	2 (15.4%)
Nurse Practitioner	3 (23.1%)
Physician	3 (23.1%)
Physician's Assistant	1 (7.7%)
Years of experience	
Less than 5	5 (38.5%)
5-9	4 (30.8%)
10-14	2 (15.4%)
15-19	1 (7.7%)
20 or greater	1 (7.7%)
Sex	
Female	13 (100.0%)
Male	0 (0.0%)

Table 2 –Comparison of Pre and Post-Education Attitude about HPV vaccination (n=11)

	Pre (n = 13) Mean (SD)	Post (n = 11) Mean (SD)	p
Improving HPV vaccination coverage is an important goal for my practice or clinic	4.54 (1.2)	4.91 (.30)	.341
HPV vaccination coverage in my practice or clinic is lower than I'd like it to be	2.85 (1.3)	2.27 (1.2)	.395
I feel confident in my practice or clinic can improve HPV vaccination coverage	4.62 (.65)	4.73 (.47)	1.00
I feel confident that I can help improve HPV vaccination coverage in my practice or clinic	4.08 (1.0)	4.80 (.42)	.025

Table 3 – Paired T-Test Attitude Analysis

Pre-intervention Mean	Post-intervention mean	P
16.3	16.8	.529

Table 4 – Evaluation of Quality Improvement Session (n = 11):

Evaluation of Quality Improvement Session	Mean (SD)
It was convenient	4.82 (.41)
The facilitator was knowledgeable	4.82 (.41)
It was understandable	4.82 (.41)
It will help my clinic improve HPV coverage	4.73 (.65)

Table 5 – Importance of QI Session Components

Importance of QI Session Components	Mean (SD)
Reviewing Coverage	4.36 (.81)
Setting goals	4.27 (.91)
Discussing Provider Recommendations	4.82 (.41)
Committing to QI Strategies to Increase Vaccination Coverage	4.64 (.67)

Table 6 – Pre-test Participant Strategies

Pre-Intervention Utilized Strategies	n(%)
Encouraged providers to routinely recommend HPV vaccine to age-eligible patients	10 (77%)
Reviewed CDC guidelines for HPV vaccination with staff.	2 (15.%)
Trained front desk staff on how to schedule appointments for HPV vaccination.	1 (7.7%)
Signed standing orders for HPV vaccination.	1 (7.7%)
Provided educational materials on HPV vaccination to parents and patients.	10 (77%)
Conducted reminder/recall for adolescent patients.	3 (23%)
None of these	1 (7.7%)

Table 7 – Kentucky Immunization Registry Data of 13 Year Old Males and Females in University of Kentucky Adolescent Medicine Clinic

	Pre-intervention 11/9/2020 n(%)	Post-intervention 2/9/2021 n(%)	p
	N = 127	N = 118	
One HPV Dose	103 (81.1%)	102 (86.4%)	.26
No HPV Doses	24 (18.9%)	16 (13.6%)	