

Using Education to Improve Human Papillomavirus Vaccine Uptake among Adolescents

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### Abstract

The human papillomavirus vaccine protects adolescents against the human papillomavirus and is recommended for all males and females starting at age 11. The human papillomavirus vaccine is an effective approach to reduce infections and associated cancers however, vaccination uptake continues to lag behind other vaccines common in adolescents. This evidence based proposal aimed to improve human papillomavirus vaccine uptake among adolescents using an education bundle. This project was a quasi-experimental, single group, prospective design which focused on ten adolescents age eleven through fourteen, who scheduled a well child check or sports physical in an urban pediatric clinic. An educational bundle was implemented prior to receiving the human papillomavirus vaccine to improve vaccine uptake. This outcome was evaluated by measuring vaccination uptake among adolescents who received the educational materials compared to baseline data from retrospective chart reviews. Results suggest that the use of the education bundle had a positive impact on HPV vaccine uptake with a 46.7 percent rate of acceptance among the pre-education group, n=16, compared to an 80 percent acceptance rate among the post-education group, n=10. When adolescents consistently accept the human papillomavirus vaccine, the overall prevalence and transmission of the virus are decreased and associated cancers can be prevented in the United States. Through the use of education, healthcare providers can improve the current human papillomavirus vaccine rates and reduce the prevalence of human papillomavirus infections and associated health complications among adolescents.

*Keywords:* human papillomavirus, vaccine, education, adolescents, uptake, barriers

### Using Education to Improve Human Papillomavirus Vaccine Uptake among Adolescents

Human papillomavirus (HPV) is a group of more than 200 viruses that can lead to health problems such as sexually transmitted infections (STIs), genital warts, and certain types of cancer (Centers for Disease Control and Prevention (CDC), 2015). HPV is transmitted through intimate skin to skin contact and is currently the most common STI affecting nearly 80 million people in the United States (CDC, 2015). The HPV vaccine protects adolescents against cancers caused by specific strains of HPV, a large number of the HPV viruses, and boosts the overall immune system (CDC, 2015).

HPV vaccination is recommended to prevent the virus and the associated complications (CDC, 2016). The HPV vaccine has been recommended for all males and females starting at age 11 since 2006 (CDC, 2016). In 2016, the Advisory Committee on Immunization Practices (ACIP) updated their recommendation to include a two-dose vaccine series for all adolescents who initiated the series at age 11 through 14 (Meites, Kempe, & Markowitz, 2016). A three-dose series is still recommended for all adolescents who receive the first dose at age 15-26 (Meites, Kempe, & Markowitz, 2016). The HPV vaccine is an effective approach to reduce HPV infections as well as the rates of high-grade cervical lesions (Markowitz, Hariri, & Lin, 2013). However, HPV vaccination uptake continues to lag behind other vaccinations common in adolescents (Voelker, 2013).

### **Significance of HPV**

It is estimated that 90 percent of sexually active females will be infected with HPV at some point in their life (CDC, 2014). The majority of HPV infections clear spontaneously, however for 20 percent of women and men, HPV will lead to genital warts, precancerous lesions, and certain cancers (Printz, 2015). The HPV infection plays a critical role in the development of

cancer and results in 33,000 cases of cancer annually in the United States (CDC, 2015; Printz, 2015).

The HPV vaccine provides protection against the HPV strains that are most likely to cause cervical cancer (Petrosky et al., 2015). Due to new recommendations, there is one vaccine approved for the protection against HPV in the United States; Gardasil 9 (Petrosky et al., 2015). The Gardasil 9 vaccine was approved in 2010 and provides protection against nine different HPV strains which are responsible for nearly 90% of all cervical cancer and genital warts (Petrosky et al., 2015; Van Damme et al., 2015).

A 2010 survey showed that only 25% of 13 through 17-year-old females received one dose of the HPV vaccine and only 11% of females received all three doses of the vaccination (Dorrell, Stokley, & Yankey, 2012). Currently, Kansas and Missouri have some of the lowest reported HPV vaccine compliance in the country (Gutierrez, 2016). HPV related cancer incidence in Missouri is 8.3 per 100,000 cases, which is higher than the national average of 7.4 (National Cancer Institute, 2015). These statistics become increasingly difficult when paired with state vaccination coverage. In Missouri only 38.5 percent of girls and 33.3 percent of boys have received and completed the HPV vaccine series (CDC, 2016).

### **Diversity Considerations**

Kansas City, Missouri has a population of 458,787, and 6.3 percent are adolescents age 10 through 14 (U.S Census Bureau, 2010). The average household income is \$47,489 and the current poverty rate is 18.3 percent (U.S Census Bureau, 2010). About 59 percent of the population identify themselves as Caucasian and 30 percent identify as African American (U.S Census Bureau, 2010). However, exploring by the zip code where the clinic is located, 47 percent are

Caucasian and 45 percent are African American (U.S Census Bureau, 2010). Five percent of individuals are also Spanish-speaking so interpretive services are often utilized.

The pediatric clinic for this project is accessible via private vehicle, public transportation, and outreach programs that assist individuals with additional transportation modes if necessary (J. Garney, personal communication, March 22, 2018). The current demographics of the adolescents that are cared for in this clinic are not available to the student investigator. The diverse demographics of Kansas City improve generalizability to a larger population.

### **Problem Statement and Intended Improvement**

The problem statement for this evidence based project (EBP) is, In spite of multiple guidelines established by the American College of Obstetrics and Gynecology (ACOG), American Cancer Society (ACS), and the American Academy of Pediatrics (AAP) which promote the use of the HPV vaccine among adolescents, the immunization rate for HPV prevention is as low as 25% in some areas of the United States (ACOG, 2017; Saslow et al., 2016; Committee on infectious Diseases, 2012). The purpose of this EBP project is to determine if the evidence-based use of an education bundle will increase the first dose of the HPV vaccine uptake in adolescents 11 through 14 years of age at SHS in Kansas City, Missouri.

HPV is the most common STI in the United States, with strains linked to oropharyngeal, cervical, and other types of cancer (Osazuwa-Peters, 2013). The HPV vaccine is a safe and effective way to reduce HPV infections among adolescents (CDC, 2015). It is important for healthcare providers to acknowledge this gap in HPV vaccine uptake in order to implement effective practice change. According to the *Journal of Cancer Education* and the *Journal of Health Psychology*, simple interventions such as education regarding the HPV vaccine, change

of parental attitudes about the HPV vaccine in a positive way, increasing overall HPV vaccination uptake (Cox, 2010; Spleen, 2011).

### **Facilitators and Barriers**

The main facilitators of this project are the setting of the study, access to the vaccine and necessary supplies, and the current pediatric nurse practitioner at the clinic who has agreed to assist the student investigator with project implementation. Parents have reported safety concerns, lack of clinician recommendation, and low-levels of knowledge as factors involved in choosing not to vaccinate their children (Remes et al., 2012; Rhodes et al., 2017). These knowledge gaps can be easily addressed by healthcare providers through education and HPV-specific written educational materials (see Appendix A).

Costs are minimal in this project and consist of paper and printer ink which facilitate this project. The author will not be compensated for her time during this project which will further decrease costs. The additional cost breakdown is provided in the budget and funds table (see Appendix B). Finally, there is a high potential for sustainability during the project. The education provided by the advanced practice registered nurse (APRN) will be very brief, written materials can be easily obtained from the CDC website, and this pediatric clinic is ideal because it routinely performs well child checks for adolescents age 11 through 14. There are also resources available if cost is an issue.

### **Review of Evidence**

#### **PICOTS**

The inquiry for this project is, In adolescent patients, age 11 through 14, does the use of an education bundle compared to patients who received no education increase the uptake of the Human papillomavirus (HPV) vaccine during a 3-month time frame in a primary care setting?

## Search Strategies

The University of Missouri-Kansas City (UMKC) Health Sciences Library was used to perform a literature search for relevant articles and evidence supporting the use of education to improve HPV vaccine uptake. This library includes key databases such as Cumulative Index of Nursing and Allied Health Literature (CINAHL), Index Medicus (MEDLINE), and PubMed. The National Guideline Clearinghouse (NGC) was also used to search for current evidence-based recommendations. Keywords that were used for this search include *HPV, vaccine, education, uptake, rate, adolescent, barriers, and knowledge*. A definition of terms has also been provided to clarify vocabularies (see Appendix C).

Search results yielded 148 peer-reviewed studies. Inclusion and exclusion criteria for this search were based on the age of participants, publication date, setting of the study, and vaccination status. Studies for this project focused on adolescent males and females age 11 through 18 and excluded results that discussed participants over the age of 26. All studies supporting this EBP project were published within the last 10 years, specifically focusing on interventions performed in a primary care setting.

A total of 19 publications were collected to provide the evidence to support the inquiry and intervention (see Appendix D). Utilizing the *Rating System for the Hierarchy of an Intervention Inquiry* (see Appendix E), each study was given a specific level of evidence (Melnik & Overholt, 2015, adapted). Of the 13 quantitative studies, seven studies were Level III and four studies were level II. The mixed method approach was also deemed a level III study. Of the two qualitative studies, one was a level V, and one was a Level VI. Lastly, all five clinical guidelines were classified as a level I on the hierarchy since they are the latest evidence-based practices relating to HPV vaccination.

### **Synthesis of Evidence by Sub-topics**

There are three topics relevant to the inquiry: HPV vaccine uptake, HPV vaccine education, and current clinical practice guidelines. The studies included six studies related to HPV vaccine uptake, which is the outcome that is being evaluated, and eight studies relevant to HPV vaccine education which is the intervention being implemented. Lastly, it is currently recommended that all adolescents ages 11 through 14 receive two doses of the HPV vaccine six to 12 months apart (CDC, 2016). In addition, five practice recommendations were identified that were relevant to current clinical practice guidelines.

#### **HPV Vaccine Uptake**

Adolescents report various influences in decision-making for receiving the HPV vaccine. In two quantitative studies, researchers utilized questionnaires in order to evaluate the effect of healthcare provider communication and vaccine awareness (Bhatta, & Phillips, 2014; Tung, Machalek & Garland, 2016). In the study by Bhatta and Phillips (2014), females and males less than 14 years of age receiving the HPV vaccine were significantly more likely to have a discussion with a parent or healthcare provider (OR=3.74; 95% CI: 2.30-6.06). Survey results from a study by Tung, Machalek and Garland (2016) indicated attitudes toward HPV infection may impact the success of the HPV vaccination program. In one quantitative study, researchers exclusively analyzed parental acceptance of the HPV vaccine before and after counseling sessions and came to similar conclusions (Mofunanya, 2011).

It is essential for healthcare providers to understand both parental and adolescent preferences to significantly improve HPV vaccination uptake (Kessels, 2012; May et al., 2017). One qualitative study performed face-to-face interviews or telephone interviews with adolescents and their parents (n=20) in order to shed light on this concept (May et al., 2017). Seventy percent



reported that they had gained HPV knowledge from their physician, confirming that physician recommendation has a significant impact on HPV vaccination uptake. One systematic review examined additional factors that are associated with HPV vaccine uptake.

Lastly, one randomized controlled trial (RCT) analyzed vaccine uptake specifically among college females age 18 through 26 (Patel, 2012). Results showed that at baseline 41% intended to initiate the HPV vaccine series however, overall HPV vaccine uptake was only 5.5 percent. Children and teens account for 18% of all preventive visits, therefore healthcare providers play an essential role in the uptake of the HPV vaccine (CDC, 2016). This data stresses the importance of advocating for the initiation of the HPV vaccine series at every appointment.

### **HPV Vaccine Education**

Education is an intervention that healthcare providers can offer to adolescents and their parents in order to improve knowledge and overall HPV vaccine uptake (Spleen, 2011). According to the *Journal of Cancer Education* and the *Journal of Health Psychology*, simple interventions such as education regarding the HPV vaccine change parental attitudes in a positive way, increasing overall HPV vaccine uptake (Cox, 2010; Spleen, 2011). Education delivery, audience, and knowledge will be evaluated in this evidence based topic.

In one systematic review researchers focused on the audience to be educated (Fu, Bonhomme, & Spring, 2014). Results showed that there was a significant increase on intent to vaccinate among parents after receiving educational brochures (RR 95% CI 1.6-2.88), and adolescents who received CDC fact sheets report an 11% increase in vaccination uptake. Another quantitative study performed by Krawczyk (2012) explored the effect of specific types of education; comparing written and video intervention and their effect of vaccination intentions. Thirty-six percent of participants reported high intent to vaccinate, although both intervention

groups reported an increase in knowledge and intent neither intervention significantly improved vaccine uptake (Krawczyk, 2012).

One quantitative study addressed tailoring education to an audience by implementing a multilingual and multicultural HPV educational DVD (Valdez et al., 2015). Participants attended an educational session and completed a questionnaire assessing their knowledge of HPV. Results showed that knowledge significantly increased ( $p < 0.0001$ ) regarding HPV and cervical cancer in the educational group compared to the control group. These results suggest that multicultural and multilingual education is beneficial in increasing HPV vaccine knowledge among a diverse population.

A cross sectional approach was used to evaluate the predictors of adults' knowledge and awareness of HPV, utilizing HPV vaccine rates (McBride & Singh, 2017). Knowledge was measured using the Health Information National Trends Survey (HINTS) survey. Sixty percent of women participants and 44% of men participants report having ever heard of HPV. A majority of the respondents also reported to not believe that the HPV vaccine is effective in preventing specific cancers; verifying that significant knowledge gaps exist (McBride & Singh, 2017). One quantitative study aimed to determine the most effective way to present HPV to improve HPV vaccination uptake among adolescents (Cox, 2011). Demographic characteristics, family history of cervical cancer, and perceptions of their daughter's sexual activity were assessed in this study however none of these variables significantly correlated with intent to vaccinate ( $p < 0.05$ ).

Another quantitative study also assessed knowledge and its effect on HPV vaccine uptake (Spleen et al., 2011). Adolescent caregivers attended an HPV educational session with an immediate follow-up questionnaire. Knowledge regarding HPV increased for all participants ( $p < 0.0001$ ) as well as intent to vaccinate ( $p = 0.002$ ). When followed up in one month 100% of

participants continued to state the education was helpful, and 44% of the caregivers reported initiating the vaccine series.

Most educational sessions were performed in a primary care setting, but the author included one study that initiated education within schools (Rieter, Stubbs, & Panozzo, 2011). This quantitative study analyzed the effect of education on parents, healthcare staff, and school staff. Participants were asked to rate their knowledge level ( $p < 0.001$ ) and attend a 30-minute HPV-specific educational session. Following the educational session more than 90% of school-staff and 97% of parents reported believing that HPV education is valuable within schools.

When providing HPV vaccine education, it is important to involve both adolescents and their parents to maximize intent to vaccinate (Fu, Bonhomme, & Spring, 2014). There is a clear correlation between education and knowledge, however current literature often lacks a further connection to HPV vaccine initiation and completion (Cox, 2011; McBride & Singh, 2017; Spleen, 2010). Currently no one method of education has been significantly more effective in HPV vaccine uptake (Fu, Bonhomme & Spring, 2014; Krawczyk, 2012). Utilizing multicultural written materials along with education has also been effective in similar studies (Valdez et al., 2015; Krawczyk, 2012).

### **Clinical Guidelines**

The CDC, ACOG, ACS, and AAP all recommend that adolescents initiate the HPV vaccine series at age 11 (Gardner et al., 2016; Nikoyan & Fischer; Saslow et al., 2016). This age is now recommended because it is likely that this population is not yet exposed to the HPV virus (CDC, 2015). As of 2016, it is also recommended that teens between 11 and 14 only receive two vaccinations, instead of the previously recommended three-dose series (Gardner et al., 2016;

Nikoyan & Fischer; Saslow et al., 2016). This two-dose recommendation is also aimed to improve completion of the HPV vaccine series (Nikoyan & Fischer, 2016).

Additional recommendations discuss presence of pre-cancers and routine cervical screenings (ACOG, 2017; Saslow et al, 2016). The HPV vaccine should be obtained regardless of a woman's abnormal Pap tests or pre-cancers and it is highly recommended that all women over the age of 21 continue routine cervical cancer screenings in order to prevent and reduce the severity of HPV infections (ACOG, 2017; CDC, 2015; Saslow et al., 2016). One quantitative systematic review reviewed the effectiveness of the HPV vaccine over 10 years (Garland et al., 2016). After six years of HPV vaccine availability HPV six, 11, 16, and 18 among women between 18 through 24 decreased by 76% after one dose of the HPV, and 86% after completion of the series (Garland et al., 2016). High-grade cervical cytological abnormalities also declined 47% over five years of the vaccination program. These results reinforced current evidence, leading the CDC (2015) to recommend a broad three-dose HPV coverage among adolescents to advance global public health.

In 2016, the CDC updated their recommendation to a simpler, two-dose vaccine series among adolescents nine through 14 (Nikoyan & Fischer, 2016). The ACOG (2017) focused their recommendations on girls and boys receiving their first dose of the HPV vaccine. This guideline states that all adolescents who initiate the HPV vaccine series between the ages of 11 through 14 only need two doses of the vaccine, endorsing current CDC recommendations (Nikoyan & Fischer, 2016). This recommendation has changed recently due to evidence stating that HPV immunogenicity did not significantly differ between younger teens receiving two-doses and adolescents 15 through 26 who received three doses of the vaccine (Romanowski et al., 2016). The ACS also reviewed evidence provided by the CDC (2016), and their results supported

current CDC recommendations related to vaccinations obtained younger in adolescents (Saslow et al., 2016).

### **Theory**

The social cognitive theory (SCT) is comprised of three types of expectancies: situation-outcome expectancy, action-outcome expectancy, and self-efficacy expectancy (Luszczynska & Schwarzer, 2005). (See Appendix F for visual diagram). Situation expectancy is the belief that consequences will occur without an interfering personal action. Action expectancy is the belief that a behavior will or will not lead to a behavior. Self-efficacy expectancy is the belief that a behavior is or is not within an individual's control (Luszczynska & Schwarzer, 2005).

Research has utilized the SCT to predict reasons for HPV vaccine intent in adolescent women (Priest, Knowlden, & Sharma, 2015). When deconstructing the SCT, HPV vaccination intent and education seamlessly coincide with one another. For example, situational-outcome expectancy is one's perception of HPV. Action-outcome expectancy is the belief that obtaining the HPV vaccine is an effective way to prevent the HPV virus. Self-efficacy expectancy is the confidence an individual achieves when being an active participant in their health decision (Priest, Knowlden, & Sharma, 2015). Based on the SCT, studies performed by May et al., (2015) and Bhatta & Phillips (2014) have identified self-control and situational perception as key predictors of HPV vaccine uptake (Priest, Knowlden & Sharma, 2015).

### **Methods**

#### **Institutional Review Board and Site Agreement**

The primary Institutional Review Board (IRB) for this project was UMKC. This student investigator was in close contact with the APRN prior to and during project implementation to ensure project acceptance at the pediatric clinic. This study was classified as not-human subject

research or evidence based quality improvement (EBQI). There is a wide spectrum of activities involved within EBQI, with many similarities to clinical research (Melnik & Finout-Overholt, 2015). This intervention attempted to improve quality based on current literature (see Appendix G for the IRB approval letter).

### **Ethical Considerations and Funding**

Confidentiality and consent are the main ethical issues in this project to ensure participant protection. Confidentiality is important to adolescents when being treated in a primary care setting (Berlan & Bravender, 2009). This will be managed through secure electronic databases, and the student investigator will not report identifying information in this project. Informed consent with minors is difficult in the state of Missouri (National Conference of State Legislatures, 2017). Currently, Missouri law allows minors access to treatment and screening of venereal diseases without parental consent, but explicit minor consent to receive the HPV vaccine is not approved at this time (National Conference of State Legislatures, 2017). For this project, consent for the HPV vaccine will be addressed with both the parent and adolescent. The student investigator did not have any conflicts of interest related to this project.

Currently, there are multiple federal programs that can assist with the cost of the HPV vaccine as well as HPV vaccine education. The Vaccines for Children (VFC) Program and Children's health insurance program (CHIP) assist in covering costs for ACIP recommended vaccines, which includes the HPV vaccine (Kaiser Foundation, 2017). Projected costs for this project include paper and ink cartridges totaling \$39.97. The student investigator was not compensated for her time, but applied to the UMKC Women's Council and Graduate Assistance Fund and received additional monetary support for travels funds associated with project dissemination at the Arkansas Nurse Practitioner Association (ANPA) Conference.

**Setting and Participants**

This study took place in the pediatric clinic located in an urban area of Kansas City, Missouri. A consecutive convenience sampling method included male and female adolescents age 11 through 14 entering the clinic for a well-child check or sports physical. The sample size was ten participants. Inclusion criteria for participants require them to be between the ages of 11 and 14 years, being seen for a well-child check or sports physical, and have not previously received the HPV vaccine. Individuals were excluded based on age, appointment type, and completion of the HPV vaccine series.

**EBP Intervention**

The intervention used an education bundle to evaluate the effect of education on vaccine uptake rates. Office staff provided HPV vaccine specific handouts to patients and their parents prior to the appointment. Providers discussed consequences related to HPV, effective prevention strategies, and concluded with the adolescent's current HPV vaccine status.

The pediatric clinic provides care to individuals beginning at infancy through 18 years of age. This project focused exclusively on adolescents 11 through 14 years of age. Participant recruitment occurred through convenience sampling of all male and female adolescents age 11 through 14 years who entered the clinic for a well child-check or sports physical. Once the patient checked in for their appointment, immunization records were reviewed by office staff from the Missouri Department of Health and Senior Services (MDHSS) website. If he or she had not received the first dose of the HPV vaccine series then the individual will be eligible to participate in the project. The adolescent's paperwork was subsequently flagged for the provider to identify an individual eligible for the education bundle.

During the initial stage of the intervention, the student investigator educated office staff and providers about clinical guidelines, current recommendations, and local immunization rates to gain staff cooperation. Next, the student investigator provided the medical assistants and office secretaries with HPV vaccine specific educational handouts. These handouts were retrieved from the CDC website, and were tailored to adolescent parents addressing common objections raised by parents. Handouts were available in both English and Spanish to address diversity and literacy concerns at this clinic. The front office staff was educated on eligible participants, demographics, and how to review HPV vaccination status prior to the appointment. Individuals who had not received the first dose of the HPV vaccine were flagged to notify the provider of eligibility. Handouts were then provided to adolescents and their parents who met inclusion criteria prior to seeing the provider.

At the adolescent appointment, the APRN discussed consequences related to HPV, effective prevention strategies, and concluded with the adolescent's current HPV vaccine status. Once reviewing eligibility to receive the HPV vaccine, the provider asked the adolescent and parent if the adolescent would like to receive the HPV vaccine at this visit. If he or she consented to the vaccine it was administered at the appointment and immunization records were updated. If the participant or parent did not consent to the HPV vaccine, immunization records remained unchanged. Reason for refusal was not documented due to current electronic database barriers. Further, the student investigator evaluated if a follow-up appointment was scheduled to receive future vaccines in the series. A visual breakdown of this interventional flow diagram is provided (see Appendix H; Appendix I).

Future additions to this education bundle can include presenting the clinic with HPV educational posters in the waiting rooms and exam rooms to reinforce vaccine recommendations.



Parents could report the main reason for vaccine consent or refusal in written documentation that would be provided to the clinic by the student investigator. Lastly, in order to promote uptake of the second dose of the HPV vaccine, parents could sign up to receive reminders such as text messages to obtain the second dose of the series six months following the initial appointment.

### **Change Process, EBP Model**

The *Change Curve Model* is evident within the student investigator's EBP project. This model states there are basic assumptions for change within an organization (Melnik & Fineout-Overholt, 2015). These assumptions state that group change requires individual change, leadership is necessary for fundamental change, and that change is an emotional process (Melnik & Fineout-Overholt, 2015). This five-stage process stresses stagnation, preparation, implementation, determination, and fruition within the model (Melnik & Fineout-Overholt, 2015). The author has already addressed stagnation and preparation when the project was developed. A visual diagram of application of the project is provided (see Appendix J).

The *Model for Evidence-Based Practice Change* was used in this project. This six step process assesses the need for change in practice, collects and analyzes the evidence, and designs a practice change to implement and maintain change overtime (Melnik & Fineout-Overholt, 2015). The student investigator has utilized this model in the development of the project by identifying a problem, locating and synthesizing evidence regarding HPV vaccine uptake, and has designed a practice change that has been implemented.

There is a high likelihood of project sustainability once it is completed. HPV vaccination status can continue to be reviewed to identify eligible adolescents. The education session is brief and can be replicated upon project completion. The educational written materials can be utilized for future appointments. Handouts can be given to adolescents and their families prior to well

child checks, posters can be placed in waiting rooms and exam rooms, and providers can continue to recommend the HPV vaccine. This use of education can continue to increase knowledge regarding HPV and the HPV vaccine, and ultimately improve HPV vaccine uptake among this crucial population.

### **Study Design**

This project was implemented at an urban pediatric clinic. A quantitative quasi-experimental single-cohort design was used. The author evaluated gender, ethnicity, age, and immunization status to obtain baseline variables. Next the education bundle was utilized for all eligible participants and concluded with evaluation for immunization uptake. Immunization uptake was then evaluated post-intervention. The impact of the education bundle was measured by HPV vaccine acceptance of the first dose or refusal of the vaccine among adolescents age 11 through 14. Results were then compared to baseline data from retrospective chart reviews.

### **Validity**

When evaluating internal validity, it is important to consider previous studies, the significance of the problem, the feasibility of the study, and the proposed setting (Melnik & Fineout-Overholt, 2015). Internal validity was controlled within this study by minimizing threats and managing extraneous variation (Polit & Beck, 2012). This study had a convenience consecutive sample of all adolescents age 11 through 14 being seen for a sports physical or well child-check which eliminates self-selection (Polit & Beck, 2012). Retrospective chart review selection was also conducted by convenience sampling. This study also occurred over three months which will reduce maturation over time (Melnik & Finout-Overholt, 2015).

The pediatric clinic provides care to a demographically diverse population, allowing for generalizability and promoting change within the community. External validity was strengthened

through the clearly defined educational bundle (Melnik & Fineout-Overholt, 2015). Frameworks provided by the SCT and *EBP model for change* has guided the development of this intervention, and is beneficial for reproducibility in similar studies. Reproducibility and feasibility allow for future studies and generalizability within transferability of the intervention.

### **Outcomes and Measurement Instruments**

The primary outcome was to increase initiation of the HPV vaccine among eligible adolescents 11 through 14 years of age who participated in the education bundle. These results were then compared to baseline data from retrospective chart reviews. A data collection template has been provided (see Appendix K). The primary outcome was measured by the incidence of obtaining the first dose of the HPV vaccine. Secondary outcomes related to this education bundle include scheduling follow up appointments for the second dose of the series if eligible. A logic model describing potential short and long-term outcomes represents the project (see appendix L).

HPV immunization records were retrieved from the MDHSS once the patient checked in. The reliability and validity of immunization status prior to the appointment is dependent on whether vaccines were obtained in the state of Missouri. Validity and reliability of the HPV vaccine uptake rate post-intervention do not need to be evaluated since this measurement is an objective rate. Previous studies have reported a high level of accuracy when using the NIS-teen to evaluate overall HPV vaccine coverage (Dorrell, Jain, & Yankey, 2011). HPV vaccine uptake has the highest accuracy within the NIS-teen with a kappa level of 0.92 (Dorrell, Jain, & Yankey, 2011). There is no procedure associated with participant completion related to this intervention, and permission to use the NIS-teen is not necessary because it is readily available to the public.

### **Quality of Data**

A power analysis was performed to calculate a significant sample size needed for this study. This was calculated with a chi-square test with a medium effect size of  $d=0.5$ , a power of 0.8, degree of freedom of 1, and an alpha of 0.05. This provided a power analysis of 31.4 participants in this quasi-experimental single-cohort study (ANZMTG Statistical Decision Tree, 2018). Benchmark measurement from the NIS-teen improve quality due to the high accuracy (Dorrell, Jain, & Yankey, 2011). Measurements regarding pre-intervention immunization status improved quality of this study because it accounts for all vaccinations received in the state of Missouri. Measurements post-intervention are objective and improve reliability and quality.

Previous literature has utilized HPV vaccine initiation and uptake as measured outcomes in similar studies (Kessels, 2012; May et al., 2017; Monfunanya, 2011). HPV vaccine uptake has been utilized to demonstrate the effect of both knowledge and education (McBride & Singh, 2017; Spleen et al., 2011). The data collected can be compared to the current published data regarding the effect of education on HPV vaccine uptake among adolescents eligible to receive the 2-dose HPV vaccine series. HPV vaccine data was also compared to current benchmark HPV vaccination status within Missouri utilizing the NIS-teen. Potential threats to the quality of the data include errors in collecting data as well as missing data or incorrectly updated immunization status. This student investigator was the only person collecting data to prevent transcription errors.

### **Analysis Plan**

Data collected in this quasi-experimental study were analyzed utilizing descriptive statistics, chi-square, and Fisher's Exact Test. Demographics, which included age, gender, and race, were collected and reported. Analysis allows for interpretation of changes from pre-to-post intervention (see Appendix M).

## **Results**

### **Setting and Participants**

This project took place at an urban pediatric primary care clinic located in Kansas City, Missouri from September 2018 to November 2018. This project had a goal of 31 participants, and obtained ten individuals in the intervention group and 16 in the retrospective group.

Participants who participated in the education bundle ranged in ages from eleven through 14 years old, and ethnicities were limited to African American and Caucasian. Genders included six females and four males in the intervention group.

### **Intervention Course**

During the month of August 2018, the student investigator performed a retrospective chart review of all adolescents seen at the pediatric clinic for a well child-check and were eligible to receive the first dose of the HPV vaccine. Sixteen adolescents were identified as eligible and all pertinent data from each visit were collected. An HPV vaccine in-service then occurred in September of 2018, and the student investigator educated staff and healthcare providers on the purpose of the evidence-based project. Healthcare providers were given specific information related to the significance of the HPV infection, local HPV vaccine rates, and current clinical guidelines. A second in-service took place in October 2018 to answer further questions by staff and address concerns related to the intervention.

This intervention took place from September 2018 to November 2018 and recruited ten adolescents. Each participant and their parents during this time period were given written educational materials prior to the appointment and verbal education during the appointment addressing common concerns related to the vaccine. Each appointment concluded with vaccination status and participants were given the opportunity to obtain the HPV vaccine at the

same visit. Results were reviewed with the APRN, discussing limitations to the recruitment process, and the feasibility of sustaining the project in 2019. Data was then analyzed in February 2019 with the assistance of faculty.

### **Outcome Data**

The purpose of the EBQI project was to determine whether the use of an education bundle improved HPV vaccine uptake among adolescents age 11 through 14 years seeking preventive healthcare at a local pediatric primary care clinic. Statistical analysis showed an improvement in HPV vaccine uptake between the intervention group and baseline group. The baseline group had 16 eligible individuals, where seven individuals obtained the HPV vaccine and nine refused. The intervention group yielded a total of ten participants where eight individuals obtained the HPV vaccine, and only two refused.

A Pearson's Chi-square and Fisher's exact test were performed to analyze the differences between the pre-education and post-education groups. The relationship between the groups did not yield a significant difference using either Pearson's Chi-square test ( $p=.096$ ) or Fisher's Exact Test ( $p=.105$ ). However, the data suggests that if the student investigator was able to achieve similar results with the original power analysis sample size of 31 participants, then HPV vaccine uptake might be significantly improved between the baseline group and intervention group (see Appendix N for the statistical analysis results table).

## **Discussion**

### **Successes**

Adolescents who participated in the project were more likely to obtain the first vaccine in the HPV vaccine series than those who did not participate in the education bundle. When participants obtained the first dose of the HPV vaccine, communication with the healthcare team

was enhanced because individuals were given the opportunity to schedule an additional follow-up appointment over the next six months. Education positively impacted patients by increasing knowledge related to the HPV vaccine and promoting overall health of the individual and community. A major success of this project was that HPV vaccination was increased among this specific population at the pediatric clinic. The project facilitator also noticed that more males consented to the HPV vaccine after participating in the education bundle.

### **Study Strengths**

The setting was an ideal location to recruit the adolescent age group. The pediatric clinic serves a pediatric population from newborn to eighteen years of age. Support from the clinic staff was helpful as well to remind providers to offer the education bundle during the visit. This was done by flagging any chart where a patient was eligible to participate in the study. Staff was very easy to communicate and easily facilitated project implementation.

Project implementation was initiated without barriers, and the in-service provided by the student investigator was helpful in obtaining support from providers. Once the project was initiated, clinic staff had few questions or concerns, and clearly understood the eligible population. Staff adequately performed all requested interventions, and stated that the project did not intervene with the current workflow.

### **Results compared to Evidence in Literature**

Upon analysis, the project had similar outcomes to previously published literature. Fu Bonhomme, and Spring (2014) focused on the audience to be educated. Results showed that there was a significant increase in intent to vaccinate among parents after receiving educational brochures, and adolescents who received CDC fact sheets report an 11% increase in vaccination uptake. Results from this study are similar to those of the EBQI project. Another study analyzed

multilingual educational materials and the effect on HPV vaccine knowledge. Results suggested a significant increase in knowledge among a diverse population. Both the intervention and results are similar to the EBQI since the student investigator utilized both English and Spanish educational materials, and results suggested a positive effect on HPV vaccine uptake.

Current guidelines state that adolescents should begin the HPV vaccine series beginning at age 11, and should only receive two doses of the vaccine if the series is subsequently completed prior to age 14 (Gardner et al., 2016; Nikoyan & Fischer; Saslow et al., 2016). These guidelines are similar to the eligibility criteria that the student investigator utilized in this EBQI. This project focused solely on adolescents age 11 through 14 who had yet to initiate the HPV vaccine series. Another similarity between the EBQI and studies performed by Spleen (2011) include a similar setting such as a private healthcare facility. Adolescent caregivers attended an HPV educational session prior to their healthcare appointment and were provided with a questionnaire following the appointment. When followed up in one month 100% of participants continued to state the education was helpful, and 44% of the caregivers reported initiating the vaccine series.

While there are many similarities between this EBQI and current literature, there are a few important differences to highlight. Two quantitative studies focused on the use of questionnaires when evaluating patient knowledge related to the HPV vaccine (Bhatta, & Phillips, 2014; Tung, Machalek & Garland, 2016). Questionnaires revealed that education provided an increase in HPV-related knowledge however, results did not provide further correlation to overall initiation of the HPV vaccine.

### **Limitations**

#### **Internal and External Validity**



There were several limitations that were identified within this EBQI. When discussing internal validity, it is important to highlight that this project implemented a consecutive convenience sample for both the baseline and intervention group. While this technique was beneficial to obtaining participants, the overall sample size was still relatively small and did not produce significant results. The project also occurred over a three-month time frame which assisted in reducing maturation over time (Melnik & Fineout-Overholt, 2015). However, between the months of September and November the number of preventive visits were relatively low compared to other months.

External validity was strengthened through the framework which guided this EBQI. The EBQI utilized the SCT and *EBP Model for Change* which is beneficial for future reproducibility. However, due to the small sample size and lack of diversity among the participants, results did not allow for generalizability. Another confounding variable is the lack of a standardized education process. While the student investigator provided the clinic with a clearly defined education bundle which consisted of written materials and verbal education, it is difficult to identify that this exact process was followed with every participant. Another limitation that was identified in this project was that many of the eligible population had already received the first dose of the vaccine and were not eligible for this project.

### **Sustainability of Effects and Plans to Maintain**

A common problem found was that the eligible age group was either being seen for an acute visit or had already initiated the HPV vaccine series. Current literature and study results show that education has a positive impact on overall HPV vaccine acceptance (Spleen, 2011). By addressing immunization status at not only physicals but at acute visits when deemed appropriate, providers can continue to promote the uptake of the HPV vaccine. It is also

important to note that providers can also address if the adolescent is eligible to receive the second dose of the series at any health visit. This will promote the overall uptake of the entire HPV vaccine series. Other ideas for sustainability discussed with the project facilitator include placing HPV vaccine brochures in the waiting rooms and HPV vaccine posters in the exam rooms.

### **Efforts to Minimize Study Limitations**

The student investigator attempted to minimize limitations during implementation of this project. Several in-services were performed during project implementation to address questions from staff and providers and ensure consistent use of the education bundle. If the education method was not consistent among participants, this could lead to different rates of uptake and overall skewed results. Another limitation of the project was the specific time frame of project implementation. The student investigator implemented this project over a three month time frame to reduce maturation over time and increase the number of eligible participants. However, upon completion of data collection and project analysis, it was noted that during the fall months adolescent preventive visits are relatively low. After discussing these findings with the project facilitator, preventive adolescent health visits are historically more common during summer months due to children being out of school. Lastly, the student investigator utilized a consecutive convenience sample to recruit participants in order to allow for greater generalizability. This was limited by uneven distribution among gender, age, and ethnicity.

### **Interpretation**

#### **Expected and Actual Outcomes**

Participants were expected to receive the first dose of the HPV vaccine series upon completion of the education bundle. The student investigator provided several in-services

throughout the project to ensure consistent usage of the education bundle. While overall HPV vaccine uptake was higher among the intervention group compared to the baseline group, there were several problems that arose during implementation.

The student investigator encountered several difficulties during project implementation. First, participant recruitment was much lower than expected. The student investigator expected to recruit a minimum of 30 participants over the three-month time period, but was only able to recruit 10. Many of the eligible age group had already started the HPV vaccine series and were ineligible for this particular project. This small sample size did not prove significant results upon further analysis. One additional failure identified was that the student investigator was unable to evaluate if a participant made a future appointment for the second dose of the vaccine series due to electronic medical record complications

### **Intervention Effectiveness and Revisions**

This project would continue to be most effective in a pediatric or adolescent primary care facility. Children and adolescents account for 18% of preventive care visits, so this would be the most effective setting for further participant recruitment. Additional project modification would include acute care visits in the criteria when providing the HPV vaccine education bundle. Since many eligible adolescents were not being seen for preventive visits, acute visits would still provide a private setting to implement the project and increase recruitment.

The education bundle positively impacted patients and their families because it increased overall knowledge and increased HPV vaccine uptake. The intervention could also widen its criteria to include overall completion of the HPV vaccine series. This project is a cost-effective intervention that could be seamlessly continued within the clinic upon project completion.

### **Expected and Actual Impact**

The estimated cost of the EBQI project, with the exception of dissemination costs, was \$39. These costs consist of paper and ink in order to print the HPV vaccine educational materials. The student investigator was not compensated for her time during project implementation, analysis, and dissemination. Estimated dissemination costs were \$860.00. Actual dissemination costs were \$767.45. Dissemination costs included poster creation, airfare and lodging in Little Rock, Arkansas, and conference fees. This EBQI has additional funding from the UMKC Women's Council Graduate Assistance Fund. The student investigator received the *Patricia Brous Award* and was granted \$400 for project dissemination and associated travel costs.

This EBQI has a high likelihood of sustainability upon project completion. This project has minimal associated costs and would be easy to integrate into the practice. This intervention can be easily maintained, and the only additional costs would be paper and toner for the written materials. Additionally, educational material can be printed in black and white in order to further decrease any costs.

### **Conclusion**

HPV is a serious problem in the United States contributing to increased STIs and cervical cancers (CDC, 2015; Romanowski, 2016). It is important that adolescents be aware of these serious health risks and make informed decisions regarding their healthcare. Education is a simple intervention that healthcare providers can offer to increase knowledge and change previous attitudes regarding the virus (Cox, 2010; Rhodes et al., 2017; Tung et al., 2016).

Current literature shows that educating adolescents about HPV has raised overall awareness of HPV and cervical cancer, changed parental attitudes toward the HPV vaccine in a positive way, and ultimately increased HPV vaccination uptake among adolescents (Bhatta &

Phillips, 2014; Cox, 2010; Fu et al., 2014; Spleen, 2011; Tung et al., 2016). When adolescents consistently accept the HPV vaccine, the overall prevalence and transmission of HPV are decreased, and up to 33,000 cases of cervical cancer can be prevented annually in the United States (CDC, 2015; Printz, 2015). Future studies can evaluate the effect of education in relation to increased knowledge, improved intent to vaccinate, improve uptake of the second dose of the HPV vaccine, and specific demographics. Researchers can further evaluate the effect of parental presence at the appointment and which specific parent was present in relation to HPV vaccine intent and uptake. Project results will be presented at the Arkansas Nurse Practitioner Association conference on April 12, 2019.

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## Appendix A: HPV Education

| DISEASES and the VACCINES THAT PREVENT THEM |  
**INFORMATION FOR PARENTS**



## HPV Vaccine for Preteens and Teens

Last updated JULY 2015

### Why does my child need HPV vaccine?

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

### When should my child be vaccinated?

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

HPV vaccination is a series of shots given over several months. The best way to remember to get your child all of the shots they need is to make an appointment for the remaining shots before you leave the doctor's office or clinic.

### What else should I know about HPV vaccine?

Girls need HPV vaccination to prevent HPV infections that can cause cancers of the anus, cervix, vagina, vulva, and the mouth/throat area. Boys need HPV vaccination to prevent HPV infections that can cause cancers of the anus, penis, and the mouth/throat area. HPV vaccination can also prevent genital warts.

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

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

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

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

### How can I get help paying for these vaccines?

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

### Where can I learn more?

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

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Appendix B: Cost Table

CDC STD prevention and education Funding		
Projected start date: 9/1/18		
<b>Item</b>	<b>Costs</b>	<b>Notes</b>
Salary Kristina Collins-DNP graduate Student	\$0.00	Student will not be compensated for data collection
RN hourly rate	\$35.00/hour	uncompensated
Educational materials	\$6.03/550 pieces of paper \$33.94/ 2 black ink cartridges	Additional printers if needed Possible colored handouts would increase ink costs
Total project costs	\$39.97	

## Appendix C: Definition of Terms

- **Consent:** permission for something to happen, or an agreement to do something (CDC, 2016)
- **Education bundle:** an evidence based, structured set of HPV specific educational interventions used for adolescents age 11-14 and their parents in order to improve HPV vaccine uptake
- **Evidence based project:** incorporates evidence based quality improvement guidelines focused on improving HPV vaccine uptake among adolescents age 11-14
- **Human papillomavirus:** a group of viruses that is spread through sexual contact that can lead to genital warts and certain types of cancer (CDC, 2015)
- **Vaccine uptake:** the action of receiving an immunization (Dube et al., 2013)

## Appendix D: Evidence Table

Table of Evidence					
<b>PICOTS</b> In adolescent patients, age 11-14, does the use of written education materials compared to patients who received no educational materials increase the uptake of the HPV vaccine during a 3-month time frame in a primary care setting?					
First author, year, title, Journal	Research Design & Evidence Level	Sample & Sampling	Measures & Reliability (if reported)	Results & Analysis Used	Limitations
<i>Subtopic: HPV vaccine uptake</i>					
May, R., Dela Cruz, I., Tsark, J., Chen, J., Abright C., Braun, K. (2017)  Human papillomavirus (HPV) vaccination motivators, barriers, and brochure preference among parents in multicultural Hawaii: A qualitative study  Journal of Cancer Education	Qualitative  Level: 6, single qualitative study	20 parents with a child 11-18 years old. Data were collected from parents through face-to-face interviews or telephone interviews 10/13-1/14.  Parents were recruited using snowball sampling starting with friends/family of principal investigator	Vaccination history, HPV knowledge and status, physician recommendation, motivators, and intent to vaccinate.  Reliability not reported.	This study confirmed that a physician plays a critical role in HPV vaccination uptake. 70% of mothers stated they had learned about the HPV vaccine from their physician  Interviews were digitally recorded and coded by a team of researchers who were trained in content analysis in order to quantify qualitative data.	Sample included only 20 parents  Participants were all mothers or a female caregiver.
Tung, I., Machalek, D., Garland, S. (2016).  Attitudes, knowledge and factors associated with human papillomavirus (HPV) vaccine uptake in adolescent girls and young women in Victoria, Australia  PloS one	Quantitative: Retrospective study Level 3	September 2011-December 2014 women aged 18-25 living in Victoria Australia  Targeted advertisements placed on social media website facebook	Responses to two web-based surveys including the VACCINE study survey were collected. Attitudes were assessed using seven point Likert scales	Attitudes towards health, HPV infection and vaccination may impact on the success of the HPV vaccination program.  Univariate and logistic regression analysis were performed with ORs and 95% CI, p<0.100	May be subject to bias recall, views of the parents were reported by the participants rather than the parents themselves and may be inaccurate

Bhatta, M., & Phillips, L. (2014) Human papillomavirus vaccine awareness, uptake, and parental and health care provider communication among 11-18 year old adolescents in a rural Appalachian Ohio county in the United States.  Journal of Rural Health	Quantitative: experimental  Level 3: Quasi-experimental	1,299 male and female participants 11-18 years old  Surveys were school-based, anonymous, and voluntary	five questions regarding the HPV vaccine were added to the 2012 youth risk behavior surveillance system (YRBSS).  95% CI	Adolescents receiving any dose of the vaccine were significantly more likely to have had a parents or healthcare provider discuss the vaccine than those who did not receive any dose.  Chi-square test; data analysis was performed using SAS 9.3.1	Questionnaire is completely voluntary, and are self-reported.  Only conducted in 1 county I Appalachian Ohio  Study did not include a question on intention to get vaccinated.
Kessels, S. (2012). Factors associated with HPV uptake in teenage girls: A systematic review  Vaccine	Systematic Review: Level 3	Sample: 25 studies were analyzed during this study. Samples ranged from 52-384,869  Of the 25 studies, 23 focused on factors that influenced initiation of the vaccination program and 2 studies reported factors associated with the completion of the HPV vaccine	success was measured by either vaccine initiation and/or completion, through a systematic review of peer-reviewed literature  Reliability not reported.	Important factors that influenced initiation and completion of the HPV vaccine included race, age, parental and adolescent knowledge, and applying this education in schools would be beneficial.  data was narratively synthesized and tabulated by outcome separately for studies reporting vaccine initiation and completion	Studies that were reviewed were not generalizable to the public, many studies did not have consistency, uptake rates that were reported were low when the vaccine was initially implemented nationwide, and non-English were excluded as well.
Patel, J (2012).  Human papillomavirus vaccine intent and uptake among female college students  American College of Health	Quantitative: Randomized Control Trial  Level 2: RCT	256 female college students age 18-26  Gynecology clinic at University of Michigan	Participants given fact sheet about HPV and vaccination given and contents reviewed with study coordinator.  P<0.05	Baseline 41% level to intent, perceived parental approval regarding HPV vaccine, but overall HPV vaccine uptake 5.5%  Chi-square t-test	Study performed 2007-2009  Focused on female seeking routine healthcare
Mofunanya, C. (2011).  Improving compliance rate of human papillomavirus (HPV) vaccine usage among	Quantitative, experimental.  Level 3: quasi experimental	20 patients in an primary care clinic who accepted counseling  After all patients were counseled, rates were	Percentages were looked at who received the first vaccine, of those who received the vaccine were reminded of follow up vaccines.	After counseling, 85% of patients accepted first dose of HPV vaccine. 75% received the second dose and 65% received third dose, exceeding national	Small sample size not representative of entire population.



female adolescents aged 11 to 21 years.  Doctoral dissertation research		looked at who received the vaccine.	Reliability not reported	average compliance rate of 27%.  Comparison with national averages	
<b>Subtopic: Education</b>					
McBride, K., Singh, S. (2017)  Predictors of Adults' Knowledge and Awareness of HPV, HPV-Associated Cancers, and the HPV Vaccine: Implications for Health Education  Health Education and behavior	Quantitative: Cross sectional approach  Level: 3, quasi experimental	Cross sectional survey data from U.S adults (N=3,103) were obtained from the HINTS questionnaire  Sample obtained through a two-stage, stratified process where addresses were randomly selected from USPS and respondents were selected from each household sampled.	HPV, HPV-associated cancer, and HPV vaccine awareness and knowledge items from HINTS were analyzed  P=0.013	Patient-provider communication that includes education, counseling, and clear recommendations favoring vaccination may improve uptake.  STATA-SE, version 13.1 statistical analysis	Data was collected via self-report.  Large percentage of the sample were over the age of 50 and/or reported no children living in the home.
Valdez, A. (2015).  Design and efficacy of a multilingual, multicultural, HPV vaccine education intervention.  Journal of communication in healthcare	Quantitative, experimental  Level 2:  randomized control trial	708 Latino and Korean American Parents  Participants watched an HPV educational DVD and a RCT was conducted to assess knowledge gains and decisional conflict	Knowledge was tested using a 12 T/F question questionnaire assessing knowledge gains, and decisional attributes  P<0.05	Findings suggest that a multicultural, multilingual intervention designed to educate diverse parents enables them to make an informed decision regarding their children and the HPV vaccine  Treatment and control groups were compared using chi square test for categorical variables and t-test for numerical variables.	Self-selection was a major limitation in this study along with focusing on Latino and Korean parents whose views may not reflect the views of those of parents from other racial groups, so these findings may not be generalized to a larger population.
Fu, L., Bonhomme, L., Spring, C. (2014)  Educational interventions to increase HPV vaccination acceptance: A systematic review	Quantitative: Systematic Review  Level 2: Systematic review	Identified 33 studies of HPV vaccination educational interventions among adolescents and adults  Searched databases of pubmed, web of Science	Relating interventions with HPV vaccination uptake or intent on HPV vaccination  Reliability not reported	Finding effective HPV vaccination educational interventions is essential to reducing HPV-associated morbidity  Meta-analysis	Search was restricted to English-language publications, so results were bias to western European, Australia, and north America

Vaccine		for English-language describing HPV education			
<p>Krawczyk, J. (2012)</p> <p>How to inform: comparing written and video education interventions to increase human papillomavirus knowledge and vaccination intentions in young adults</p> <p>American College of Health</p>	<p>Quantitative: randomized control trial</p> <p>Level 2: RCT</p>	<p>200 male and female students</p> <p>McGill University, Montreal</p>	<p>HPV vaccination intent on a 7-point scale assessed immediately post-intervention</p> <p>Reliability not reported</p>	<p>Low baseline knowledge and intentions were found across groups. Post-intervention has higher knowledge and intent than the control, no difference found between written and video interventions</p>	<p>Average age was 18</p> <p>Only 60 males were assessed in the study</p>
<p>Reiter, P. (2011).</p> <p>HPV and HPV vaccine education intervention: effects on parents, healthcare staff, and school staff.</p> <p>Cancer epidemiology, biomarkers, and prevention</p>	<p>Quantitative, experimental</p> <p>Level 3: quasi-experimental</p>	<p>376 parents, 118 health care staff, 456 school staff (total n = 950)</p> <p>All attended one educational session and completely one self-survey</p>	<p>Participants were asked about their knowledge of HPV vaccine on a scale of 1-10, and about current statistics regarding HPV with multiple choice and T/F questions</p> <p>P&lt;0.001</p>	<p>Participants has low baseline knowledge regarding HPV, following education more than 90% of school staff believed HPV education is valuable within schools. 97% of parents agree and 85% of school staff members are supportive of vaccine clinics.</p> <p>Knowledge was compared with pre and post self-reported surveys. Using SAS version 9.2 using two tailed statistic test</p>	<p>Conducting educational sessions among convenience samples in only 1 county in North Carolina, having few male participants, and not having physicians as part of the sample health care staff.</p>
<p>Spleen, A. (2011).</p> <p>An increase in HPV-related knowledge and vaccination intent among parental and non-parental caregivers of adolescent girls, age 9-17 years, in Appalachian Pennsylvania.</p>	<p>Quantitative, experimental.</p> <p>Level 3: quasi-experimental</p>	<p>117 attendees of an HPV educational session</p> <p>Surveys were given prior to session and immediately following with a 1 month follow up phone interview as well.</p>	<p>Pre and post-tests following HPV educational session measuring knowledge regarding HPV vaccinations</p> <p>p&lt;0.05</p>	<p>Knowledge summary scores regarding HPV increased from 12.9 to 14.9. 70% reported the vaccine might increase promiscuity, 49% believed their daughter was not at risk for HPV, and however, there was increase intent to vaccinate.</p>	

Journal of Cancer Education				Two sided t-test, and knowledge was significantly increased with intent to vaccinate within 6 months.	
Cox, D. (2010). Behavioral interventions to increase HPV vaccination acceptability among mothers of young girls.  Health psychology	Quantitative, experimental.  Level 3: quasi-experimental	522 mothers of daughters aged 11-16.  Recruited from an online national survey purchased from SSI	Mothers were directed to the survey and were given education and asked if they would vaccinate their daughters.  $P < 0.05$	Both risk intervention formats appear to be effective when used separate than when used together and increase vaccine acceptability.  One-way ANOVA statistical analysis	Variables included parents, not adolescents.  Intervention was not used in a clinical setting  The study should be implemented in a randomized control study.
Wetzel, C., Tissot, A., Kollar, L., Hillard, P., Stone, R., Kahn, J. (2007)  Development of an HPV educational protocol for adolescents  Journal of pediatric and adolescent health	Quantitative, experimental.  Level 3: quasi-experimental	252 adolescent girls and boys in the three study phases	Phase 1: investigators developed the protocol. Phase 2: adolescents evaluated the protocol qualitatively, investigators evaluated its effectiveness in increased HPV knowledge. Phase 3: investigators evaluated the effectiveness of the revised protocol  $P < 0.0001$	Scores on the HPV knowledge scale increased significantly among adolescents who participated in phases 2 and 3 after they received the protocol	Limitations: small sample, multiple phases within 1 study leading to an increase in variables.
<b>Subtopic:</b> <b>Clinical Guidelines</b>					
American College of Obstetrics and Gynecology (ACOG) (2017). Human papillomavirus vaccination.	Evidence based guideline -level 1	Recommendations and conclusions regarding the human papillomavirus. Adolescents 9-26.	For girls and boys who receive their first dose of HPV vaccine before 15 years of age, only two doses are needed. The timing of the two doses is 0 (baseline) and 6–12 months. If the interval between the two doses is less than 5 months, a third dose is recommended. If females or males receive their first dose at 15 years	Obstetrician–gynecologists and other health care providers should stress to parents and patients the benefits and safety of HPV vaccination and offer HPV vaccines in their office	No limitations identified

			of age or older, three doses are needed and given at 0 (baseline), 1–2 months after the first dose, and 6 months after the first dose.		
<p>Saslow, D., Andrews, K. S., Manassaram-Baptiste, D. (2016)</p> <p>Human papillomavirus vaccination guideline update: American Cancer Society guideline endorsement</p> <p>A cancer journal for clinicians</p>	Evidence based guideline-level 1	The CDC conducted a content review of the ACIP HPV vaccine use recommendations as part of the ACS endorsement process. The objective of the content review was to assess the specific recommendations made and the extent to which the available evidence supports each recommendation	The American Cancer Society (ACS) reviewed and updated its guideline on human papillomavirus (HPV) vaccination based on a methodologic and content review of the Advisory Committee on Immunization Practices (ACIP) HPV vaccination recommendations	The ACS recommends vaccination of all children at ages 11 and 12 years to protect against HPV infections that lead to several cancers and pre-cancers.	No limitations identified
<p>Garland, S., Kjaer, S., Munoz, N., Block, S. (2016)</p> <p>Impact and effectiveness of the quadrivalent human papillomavirus vaccine: a systematic review of 10 years of real-world experience</p> <p>Clinical infectious diseases</p>	Quantitative: Systematic review-level 2	Searching pubmed for 903 articles, 58 publications with observational studies of effectiveness of HPV vaccination on HPV infectious disease were considered	HPV vaccine uptake compared with HPV infection active of 6/11/16/18 over 10 years to determine efficacy	Subsequent to introduction of the HPV vaccine, consistent decreases in prevalence of HPV 6/11/16/18 among females in their teens and 20s	Assessment of population impact depends on multiple factors including the breadth of the immunization program, completeness and accuracy of data sources, availability and utilization of screening programs,.
<p>Nikoyan, E., Fischer, P. (2016)</p> <p>CDC recommends simpler HPV vaccine series for young adolescents</p> <p>Infectious disease alert</p>	Evidence Based guideline- level 1	CDC and the Advisory Committee on Immunization Practices (ACIP) made this recommendation after a thorough review of studies indicating that two doses of HPV	Evidence-based approach to recommend treatment change in HPV dosing in younger adolescents.	The recommendation for a two-dose HPV vaccination schedule for younger adolescents should lead to higher completion rates than those achieved with the three-dose HPV	There are still major barriers that exist to reaching the goal to increase HPV vaccination coverage of males and females.

		vaccine in 9- to 14-year-olds produce an immune response similar to or greater than the response in young adults older than 15 years of age who received three doses.		vaccination schedule in the United States.	
Workowski, K. (2010) Human papillomavirus (HPV) infection. In: Sexually transmitted diseases treatment guidelines. Centers for disease control and prevention	Evidence based practice guideline. Systematic review with evidence tables: Level 1	Searches of electronic databases.  Number of sources not specified.	the CDC used expert consensus to formulate the major recommendations validated by peer review	Women older than 30 undergoing cervical cancer screening should be tested for HPV, treat individuals with lesions and symptoms with antivirals but do not treat those with sub-clinical HPV due to overexposure to antivirals. and lastly vaccinate all girls aged 13-26 and males aged 9-26 to prevent against HPV and genital warts. the CDC reviewed published meta-analysis and systematic review with evidence tables	No limitations identified

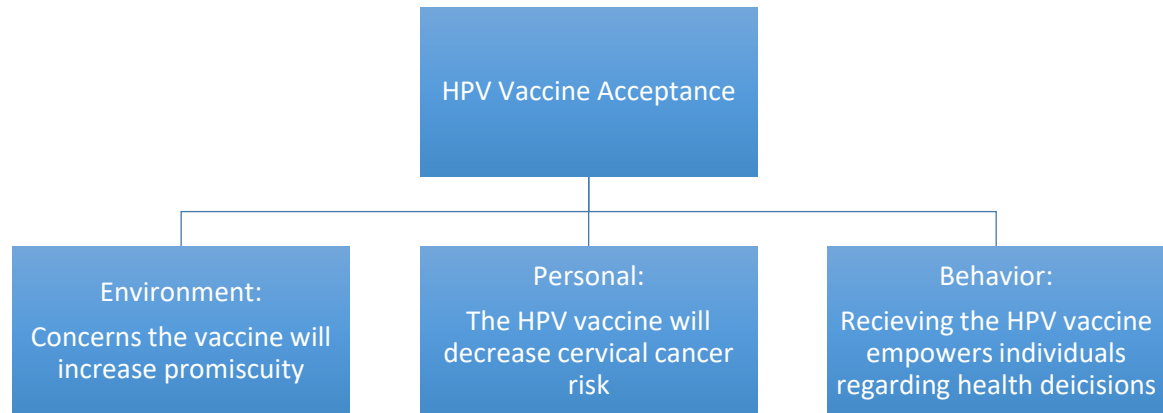
## Appendix E: Hierarchy of Evidence

<b>Rating System for the Hierarchy of Evidence For an Interventional Inquiry</b> (Modification by Dr. Lindholm for course N5613)	
Level I	Evidence from a systematic review or meta-analysis of all relevant RCTs. <i>Evidence-based clinical practice guidelines based on systematic reviews of RCTs</i> .*
Level II	Evidence obtained from well-designed RCT. <i>Quantitative systematic review of well-designed controlled trial without randomization.</i>
Level III	Evidence obtained from well-designed controlled trial without randomization ( <i>quasi-experimental</i> ). <i>Quantitative systematic review of case-control, cohort, or correlational studies.</i>
Level IV	Evidence from well-designed case-control or cohort study ( <i>or cross-sectional study</i> )
Level V	Evidence from systematic review of <i>quantitative</i> descriptive ( <i>no relationships to examine</i> ) or qualitative studies.
Level VI	Evidence from a single <i>quantitative</i> descriptive ( <i>no relationships to examine in the study</i> ) or qualitative study
Level VII	Evidence from the opinion of authorities and/or reports of expert committees

Melnyk, B.M. & Fineout-Overholt, E. (2015). *Evidence-based practice in nursing and healthcare*. Philadelphia Lippincott Williams & Wilkins,.

*\*Italics, appropriate in this category, modification by LL 2017 based on opinions from experts to place SR at one level higher than single study design level.*

## Appendix F: Social Cognitive Theory

**Reinforcement:**

Perceived consequences  
Various reinforcement  
Self-reinforcement

**Observational Learning:**

Attentional processes  
Retention processes  
Motor reproductive processes  
Acquisition processes

**Outcome Expectations:****Outcome Expectancies:****Efficacy Expectations:**

performance Accomplishments  
vicarious experiences  
verbal persuasion  
physiological State

**Self-Observation****Self-Judgement****Self-Reaction**

Retrieved from:

<http://www.ntcu.edu.tw/je0071/Health%20Promotion%20Planning%20Indina/p4p1.htm>

## Appendix G: IRB Approval Letter



UMKC  
5319 Rockhill Road  
Kansas City, MO 64110  
TEL: (816) 235-5927  
FAX: (816) 235-5602

**NOT HUMAN SUBJECTS RESEARCH DETERMINATION**

Principal Investigator: Ms. Janet Wood  
6372 S. Farm Rd, 119  
Brookline Station, MO 65619

Protocol Number: 18-196  
Protocol Title: Using Education to Improve Human Papilloma Virus Vaccine Uptake  
Type of Review: Not Human Subjects Determination

**Date of Determination: 07/31/2018**

Dear Ms. Wood,

The above referenced study, and your participation as a principal investigator, was reviewed and determined to be Not Human Subjects Research (NHSR). As such, your activity falls outside the parameters of IRB review. You may conduct your study, without additional obligation to the IRB, as described in your application.

The NHSR Determination is based upon the following Federally provided definitions:

**"Research"** is defined by these regulations as "a systematic investigation, including research development, testing and evaluation, designed to develop or contribute to generalizable knowledge."

The regulations define a **"Human Subject"** as "a living individual about whom an investigator (whether professional or student) conducting research obtains: data through intervention or interaction with the individual, or identifiable private information."

Attachments include the following:  
site approval\_20180616135012.pdf; HPV education materials.docx; Collins Methods.docx; Collins\_faculty\_approval.pdf

All Human Subjects Research must be submitted to the IRB. If your study changes in such a way that it becomes Human Subjects Research, please contact the Research Compliance office immediately for the appropriate course of action.

Please contact the Research Compliance Office (email: [umkcirb@umkc.edu](mailto:umkcirb@umkc.edu); phone: (816)235-5927) if you have questions or require further information.

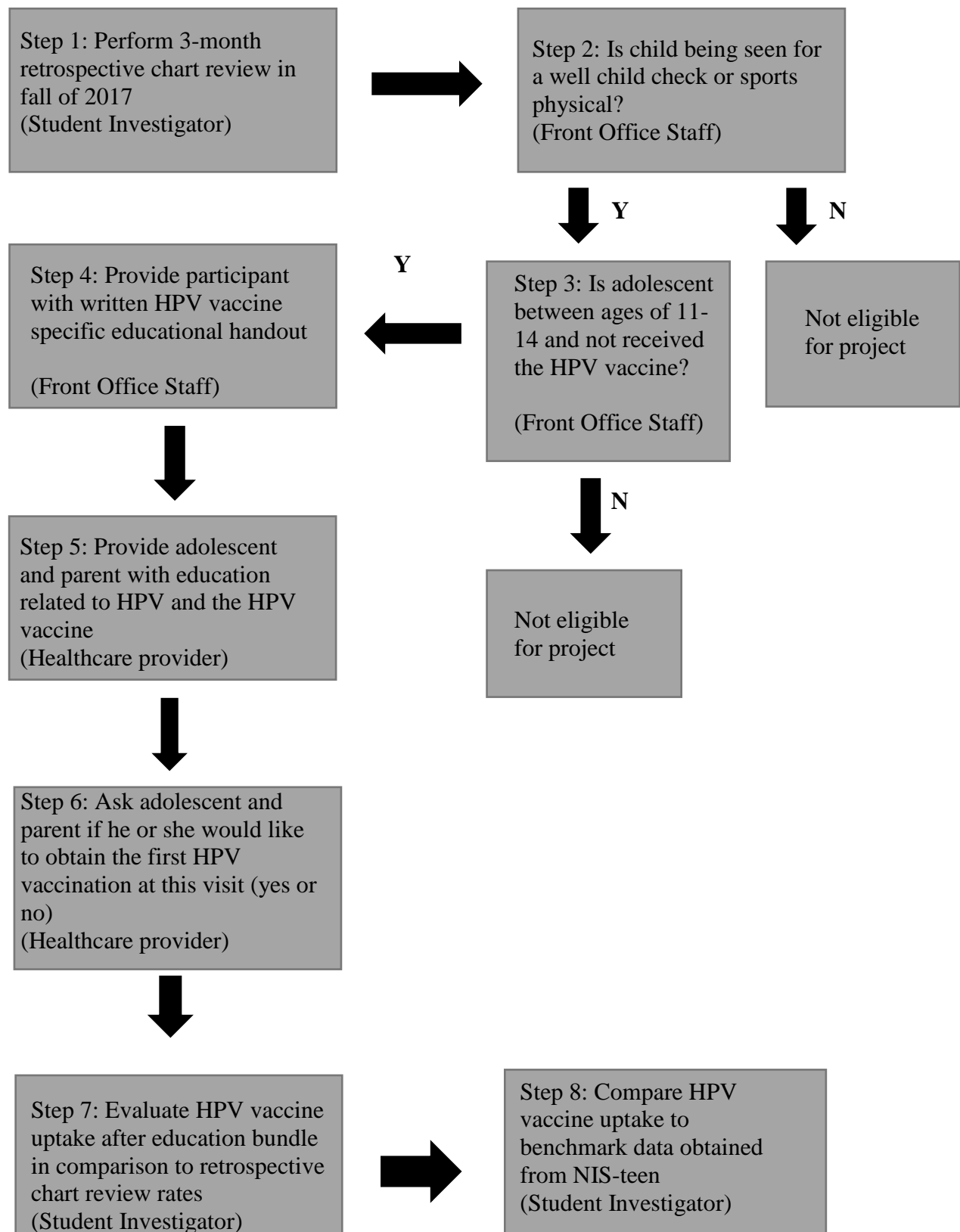
Thank you,

A handwritten signature in black ink, appearing to read "C. Thompson".

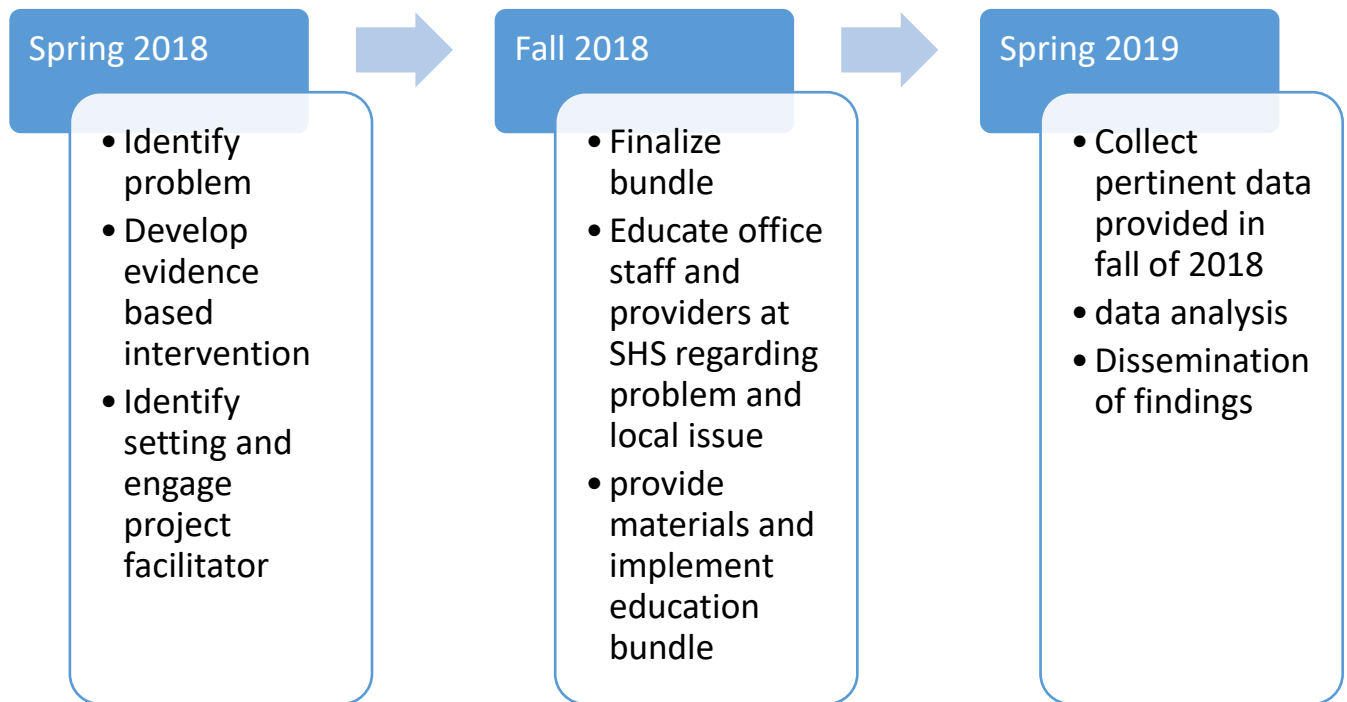
Cynthia Thompson  
UMKC IRB Administrative Office



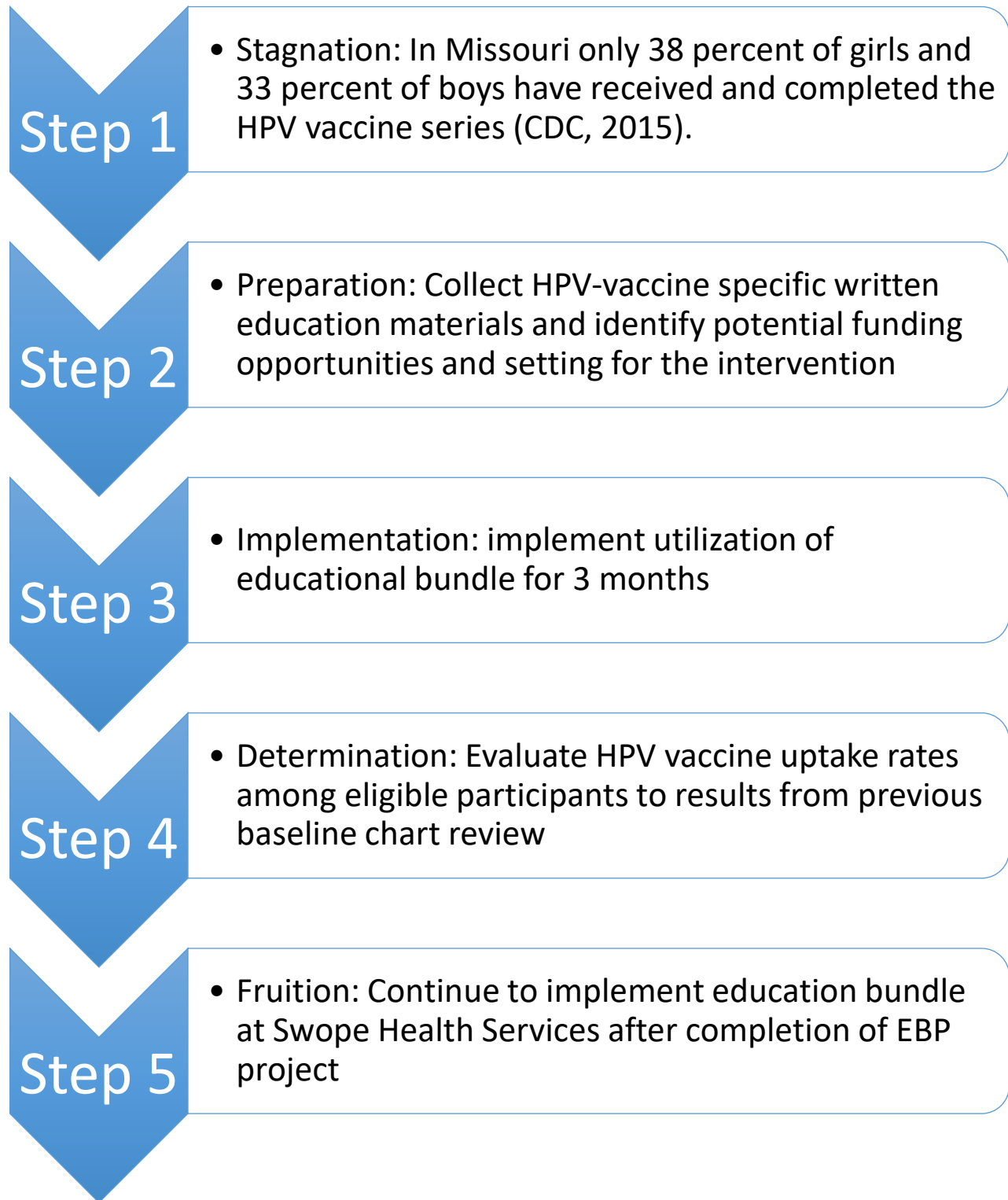
Appendix H: Intervention flow Diagram



## Appendix I: Timeline Flow Chart



## Appendix J: Change Curve Model Diagram



Melnyk, D.M. & Fineout-Overholt, E. (2015). *Evidence-based practice in nursing and healthcare: a guide to best practice* (3<sup>rd</sup> ed). Philadelphia: Wolters Kluwer/Lippincott Williams & Wilkins.

## Appendix K: Data Collection Template

Analysis Template 1.sav [DataSet1] - IBM SPSS Statistics Data Editor

	Name	Type	Width	Decimals	Label	Values	Missing	Columns	Align	Measure	Role
1	Group	Numeric	8	2		{1.00, Chart...	None	8	Right	Nominal	Input
2	Age	Numeric	8	2		None	None	8	Right	Scale	Input
3	Gender	Numeric	8	2		{1.00, Fema...	None	8	Right	Nominal	Input
4	Race	Numeric	8	2		{1.00, Cauc...	None	8	Right	Nominal	Input
5	Uptake	Numeric	8	2		{1.00, Yes}...	None	8	Right	No...	Input
6											
7											
8											
9											
10											
11											
12											
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14											
15											
16											
17											
18											
19											

Data View Variable View

Analysis Template 1.sav [DataSet1] - IBM SPSS Statistics Data Editor

Visible: 5 of 5 Variables

	Group	Age	Gender	Race	Uptake	var	var	var	var	var	var	var
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
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15												
16												
17												

Data View Variable View

IBM SPSS Statistics Processor is ready Unicode:ON

## Appendix L: Logic Model

Logic Model for DNP Project					
Student: Kristina Collins					
Inquiry, PICOTS: (P) In adolescent patients, age 11-14, (I) does the use of and education bundle (C) compared to patients who received no educational materials (O) increase the uptake of the HPV vaccine (T) during a 3-month time frame (S) in a primary care setting?					
Inputs	Intervention(s) Outputs		Outcomes -- Impact		
	Activities	Participation	Short	Medium	Long
<b>Evidence, sub-topics</b> 1. HPV vaccine uptake 2. HPV vaccine education 3. Clinical guidelines  <b>Major Facilitators or Contributors</b> 1. High level of knowledge regarding HPV 2. Provider recommendation 3. clinical guideline recommendations 4. efficacy of the vaccine  <b>Major Barriers or Challenges</b> 1. low-level of knowledge regarding HPV 2. perceived attitudes of the vaccine 3. access to healthcare 4. cost and safety of the vaccine	<b>EBP intervention which is supported by the evidence in the Input column (brief phrase)</b> Provide HPV-specific education and educational materials to adolescents age 11-14 <b>Major steps of the intervention (brief phrases)</b> 1. obtain Jackson county HPV vaccine rate 2. Screen for eligibility 3. Provide education bundle to eligible adolescents 4. Receive/ refuse first dose of HPV vaccine 5. Evaluate HPV vaccine uptake rate between intervention group and chart review	<b>The participants (subjects)</b> All adolescents age 11-14 entering SHS being seen for a WCC or sports physical, not yet received the HPV vaccine <b>Site</b> SHS-pediatric clinic <b>Time Frame</b> 3 months <b>Consent or assent Needed</b> Consent needed to receive vaccination  <b>Other person(s) collecting data</b> No <b>Others directly involved in consent or data collection</b> yes	<b>(Completed during DNP Project) Outcome(s) to be measured</b> Primary: increase in HPV vaccine uptake among adolescents after receiving education bundle compared previous chart review with no bundle  <b>Measurement tool(s)</b> 1. HPV vaccine uptake rate  <b>Statistical analysis to be used</b> 1. chi-square test	<b>(after student DNP) Outcomes to be measured</b> The author will measure the HPV vaccine uptake rate among eligible adolescents in pre-and post education. HPV vaccine uptake rates will be compared between both groups to evaluate the effectiveness of education. If uptake is increased among the intervention group, the intervention will be considered a success.	<b>(after student DNP) Outcomes that are potentials</b> 1. improve HPV vaccine intent, without actual uptake 2. increase knowledge related to HPV, but not improve HPV vaccine uptake  3. change attitudes in a positive way regarding the HPV vaccine, but not improve HPV vaccine uptake

Rev. 7/09, 1/2015 [http://www.uwex.edu/ces/lmcourse/interface/coop\\_M1\\_Overview.htm](http://www.uwex.edu/ces/lmcourse/interface/coop_M1_Overview.htm) Logic-Model Worksheet content revisions by Lyla Lindholm for DNP Project. Not to be placed on web for public use. For UMKC DNP coursework only.

Appendix M: Statistical Analysis Template Table

	Intervention Group	Baseline Group	Significance (p)
Participants			
Mean Age			
Gender			
Race			
HPV Vaccine Uptake			

Appendix N: Statistical Results Table, Vaccination Pre and Post

	Value	df	Asymptomatic Significance (2-sided)	Exact Significance (2-sided)	Exact Significance (1-sided)
Pearson Chi-Square	2.778	1	.096		
Fisher's Exact Test				.211	.105