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HPV Vaccine Hesitancy in the Adolescent Population

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SECTION 1: Introduction

Human Papillomavirus (HPV) is the most common type of sexually transmitted infection (STI) in the United States. In the United States approximately 80 million people are infected with HPV, and every year there are around 14 million new infections (Cotache-Condaor et al., 2022). HPV causes genital warts and different types of cancers in both males and females. The different types of cancers that HPV can cause include vaginal, cervical, penile, vulvar, anal, and oropharyngeal cancer. Oropharyngeal cancers include the throat, tonsils, and base of the tongue (CDC, 2022).

Eighty-five percent of sexually active people will be infected with the HPV virus (CDC, 2021c). In the United States, HPV is the cause of approximately 36,500 cancer cases in both men and women every year. The HPV Vaccine can prevent an estimated 33,700 of these cancer cases. That is more than 90% of cancers are prevented through vaccination (CDC, 2021c). Cervical cancer is the most common type of cancer caused by HPV in women. Oropharyngeal cancers are the most common cause of HPV-related cancer in men (CDC, 2023).

One of the most recognized cancers caused by HPV is cervical cancer. HPV is the cause of 11,000 cases of cervical cancer each year, and this is even with pap smear screening. Every year, at least 4,000 women die from cervical cancer. The stats on cervical pre-cancer include approximately 196,00 cases every year in the United States, and this can have an impact on women's ability to carry or birth children in the future (CDC, 2021a).

Other cancers mentioned, including oropharyngeal, anal, and penile, have no recommended screenings for early detection, which means these cancers are not diagnosed until severe health issues are detected (CDC, 2021a).

HPV vaccination is a safe preventative tool that can prevent HPV infection, and therefore, prevent cancer in the future as an adult when administered to the adolescent population per guidelines. The current vaccine available is the 9-valent vaccine, and it protects against nine different types of HPV that most commonly cause cancer and genital warts (Peterson et al., 2020).

Problem Overview

The purpose of this capstone paper is to provide further information and research to support the importance of HPV vaccine administration in our youth population to prevent cancer. The CDC recommends HPV vaccination administration to be given at 11 to 12 years of age in two doses to prevent HPV-related cancers in adulthood. Adolescents who start the vaccine at age 15 will need a three-dose series for coverage (CDC, 2021a). The goal for Healthy People 2030 is to target 80% of the adolescent population to complete the HPV vaccine series. The data available from 2021 states that 58.5% of the population is vaccinated (Healthy People, 2030).

Those infected with HPV may not have any signs or symptoms. This results in passing the HPV virus without knowing that they are infected. The best way to prevent infection is to be vaccinated before having sexual contact (Shultz & Ben-Joseph, 2022).

Cotache-Condor et al. (2022) report that HPV vaccination rates for adolescent males are approximately 36% and for adolescent females 41%. The article attributes this to several causes including parental hesitancy, poor preventative care in the adolescent population, and the lack of strong recommendations by pediatricians and other healthcare providers. Another reason includes a lack of completion of the vaccine schedule. There is also a lack of perception of the need for vaccination in the adolescent population to prevent HPV infection. Lastly, there is also a lack of knowledge on the safety and efficacy of the HPV vaccine (Cotache-Condor et al., 2022).

Definition of Terms

Nguyen et al. (2021) define vaccine hesitancy as refusing or delaying vaccine acceptance despite the vaccine availability.

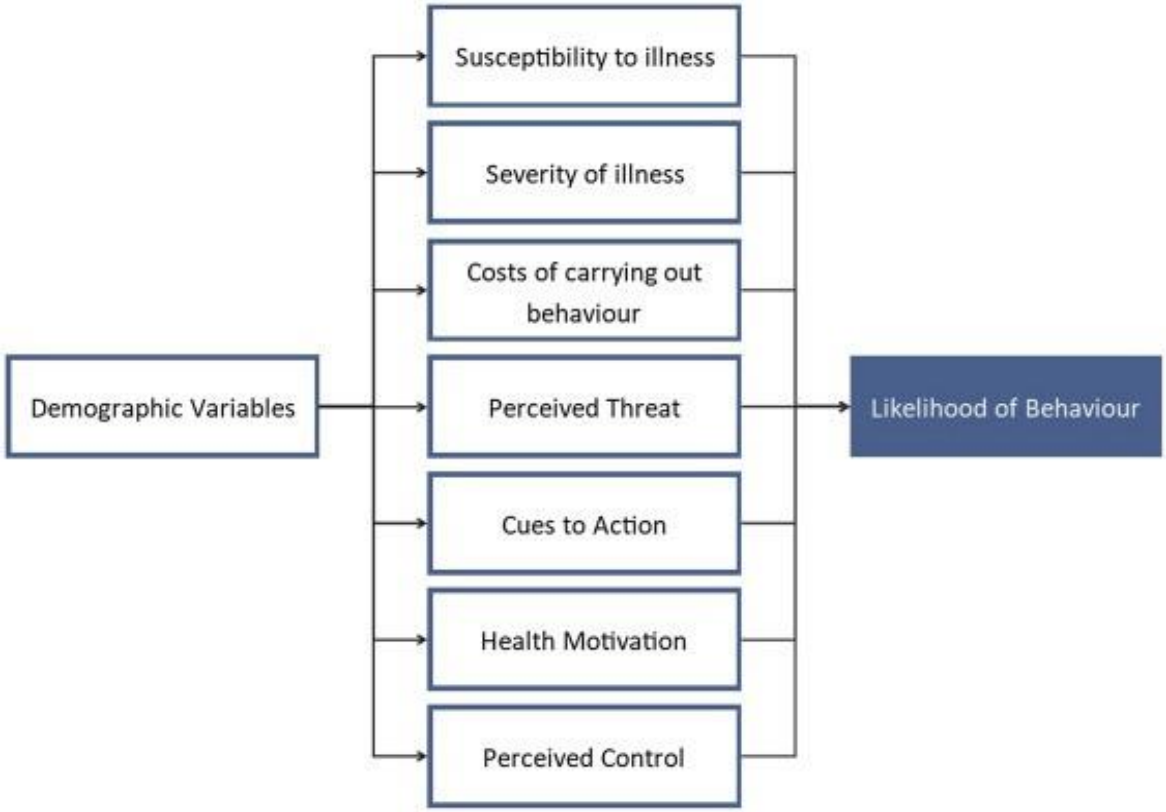
Purpose Statement/PICO Question

The purpose of this capstone paper is to emphasize the importance of vaccinating the adolescent population to decrease incidents of HPV infection and to understand the barriers that cause suboptimal vaccination rates. This capstone paper also explores the impact of the HPV virus, which causes many harmful diseases in both the female and male populations, including cancer and genital warts.

Theoretical Framework

The health behavior theory is utilized to promote positive health behavioral changes for disease management and prevention (Butts & Rich, 2018). Vaccines are used for disease prevention from birth and throughout a person's lifetime. The role of the advanced practice nurse is to promote healthy behaviors and preventative care. The health belief model (HBM) is a health behavior theory (Butts & Rich, 2018). This theory focuses on the population's knowledge and perception of susceptibility to diseases. The population's perception of the seriousness of potential disease plays a role in their desire and willingness to follow current health promotion recommendations. The HBM targets both short-term and long-term health behavior changes. The purpose of this capstone paper is to emphasize the importance and benefits of administering the HPV vaccine. HPV vaccine administration can prevent future health concerns, including cancer, in both male and female populations. Advanced practice nurses can also use this knowledge to assess for high-risk behaviors. The information can be used to educate their patients on healthy behaviors and habits (Butts & Rich, 2018).

Cotache-Condor et al. (2020) applied several theoretical frameworks to the HPV vaccine interventions in the United States, including the HBM. The systematic review reported that the HBM was used in the 18- to 26-year-old populations to assess health behaviors and was beneficial in educational settings. They were evaluating vaccine uptake, completion, intention, and attitude. The study found overall that the results were inconclusive, and the application of theory for the HPV vaccination is still in the development phase. There is also still a gap and disparities in providing effective preventative care to populations in the United States (Cotache-Conor et al., 2020).



(Science Direct, 2022)

SECTION 2: Literature Review

The literature search was focused on the effects of HPV as well as barriers to HPV vaccination in the adolescent population. The databases that were used to search for literature included Medline and CINAHL. The articles in the literature review did not go beyond five years or from 2018. The adolescent population was the focus of the Capstone project, but there were articles from the young adult population that included helpful research. The most common types of studies in the research included cross-sectional, meta-analyses, and surveys. The phrases used in the search included "HPV vaccine hesitancy," "HPV social media," and "impact of HPV." The following section discusses parental vaccine hesitancy, weak healthcare provider recommendations, and social media misinformation.

Presentation of Literature

Parental Vaccine Hesitancy

Parental vaccine hesitancy is a significant barrier to reaching optimal HPV vaccination rates in the adolescent population (Nguyen et al., 2021). According to Nguyen et al. (2021), one in five parents was hesitant to vaccinate their adolescent for HPV. Coverage for HPV vaccination is significantly lower at 18% to 24% in adolescents with hesitant parents when compared to parents who were not hesitant to vaccinate (Nguyen et al., 2021).

A third of parents are hesitant to vaccinate their children for HPV due to concerns about side effects and the effectiveness of the vaccine. They also may believe that this vaccine is unnecessary for their adolescent children, and this is a significant barrier (Nguyen et al., 2021).

Nguyen et al. (2021) discussed the 2018 and 2019 National Immunization Survey (NIS), which is a random yearly telephone survey used to monitor vaccines given to the adolescent

population in 50 states in the United States. The survey participants were parents or guardians of adolescents. Sixty-four of the respondents were mothers, and they were identified as the primary decision-makers regarding childhood vaccinations. The surveys found that more mothers were vaccine-hesitant than fathers or other guardians. Vaccine hesitancy was also higher among mothers who reported a lower income level, a lower educational level, and parents who did not get an HPV vaccine recommendation.

The findings from both the 2018 and 2019 surveys showed that 17.6% of mothers reported that they were hesitant to adolescent HPV vaccines. The survey also found that 21.6% of mothers were concerned about long-term side effects that could be serious. Another 12.2% of people interviewed reported that they knew someone who suffered from long-term severe vaccine side effects. The studies also found that parents with vaccine hesitancy who had male adolescents were significantly less likely to vaccinate when compared to parents who were vaccine-hesitant with female adolescents (Nguyen et al., 2021).

HPV vaccine rates are still below goal due to vaccine hesitancy (Beavis et al., 2021; Shapiro, 2002). Beavis et al. (2021) conducted a study that included an interview and screening survey. The study aimed to assess strategies that would assist in motivating vaccine-hesitant parents to vaccinate their 10- to 17-year-old children against HPV. Twenty-two parents who were hesitant to vaccinate their children for HPV were interviewed and surveyed in this study. Seventy-seven percent of the participants were female. Fifty percent of the female participants were non-Hispanic White, and 36% were African American. First, parents expressed concerns about the vaccine's safety and side effects. They desired more information on the HPV vaccine and questioned if the vaccine was necessary. Second, these parents did not see the purpose of the vaccine because they did not believe their child was susceptible to contracting HPV. They also

reported religious reasons, stating they believed their adolescent would be sexually abstinent until marriage. The perception was that the vaccine was not an essential risk for their adolescent child. The third finding was that parents felt dissatisfied with the pediatric healthcare provider encounters due to judgmental and one-sided conversations about the vaccine. They felt the provider did not present them with information so that they could make an informed decision for their child. One parent reported that she felt coerced and almost forced to vaccinate her child. Parents reported that these encounters caused mistrust in their adolescent healthcare providers (Beavis et al., 2021).

In the last study of this section, McKenzie et al. (2023) surveyed 512 parents with vaccine-eligible children. The eligible parents had children 11 to 17 years old, including boys and girls. Twenty-one percent of parents reported that their children were not sexually active, and they did not see the need for the vaccine (McKenzie et al., 2023). Additionally, parents believed it was inappropriate to vaccinate their young children for STI's since their child was too young. Parents who reported their children were "too young" accounted for 31.6% even though their children were at least 11 years old and eligible for vaccination per recommendations This survey also identified a common stigma related to the HPV vaccine. Parents felt if they asked about vaccine information or vaccinated their child that it would encourage their child to become sexually active. These parents were also less likely to communicate with their providers about concerns. In the study, 80.5% of parents did have positive attitudes toward general vaccinations that did not include HPV (McKenzie et al., 2023).

Weak Healthcare Provider Recommendations

Healthcare provider (HCP) recommendations for HPV vaccination are impacted by their attitude, beliefs, and knowledge of HPV and the HPV vaccine. HCPs in this section include

physician assistants, nurse practitioners, and physicians who practice in various settings. Healthcare providers play a critical role in increasing HPV vaccination rates. Increased vaccination rates are related to strong HCP recommendations. Strong recommendations were supported by presenting correct information about the vaccine and side effects. Also, it includes information about the benefits of HPV vaccination and risk reduction for disease (Btoush et al., 2022). Pediatric offices were found to be more likely to recommend HPV vaccination per guidelines. Also, the practices that reported increased vaccination recommendations had a higher population of Hispanic patients (Btoush et al., 2022).

In Btoush et al. (2022), only 35% to 48% of HCPs reported discussing HPV vaccination with the parents of the adolescent population. They reported deferring the discussion of the HPV vaccine if they believed the patient was too young or low risk. Likewise, McKenzie et al. (2023) also reported parents did not want to vaccinate their children because they felt they were too young. These HCPs also admitted discomfort in discussing sexuality. The providers that were non-pediatric reported a lack of knowledge about HPV vaccination and a lack of self-confidence. They also reported they had their safety concerns. Due to a lack of vaccine knowledge, these providers felt uncomfortable with addressing parents' safety concerns (Btoush et al., 2022).

The following study to discuss is from Cunningham-Erves et al. (2022). This study used a qualitative study design to assist providers in addressing HPV vaccine hesitancy and tools to improve parental HPV vaccine hesitancy. The study used a 10-item brief survey to identify barriers for vaccine-hesitant parents. The researchers reported that vaccine hesitancy increased after the COVID-19 pandemic. Low-quality and inconsistent HCP recommendation for the HPV vaccine has impacted HPV vaccine hesitancy in parents. Other factors for HCPs include personal biases, lack of skills, and perceived discomfort from parents. Some providers felt they did not

have enough time to discuss the importance of HPV vaccination with hesitant parents. There were also mixed messages and inaccurate information given by providers. Clinic protocols and a need for practice standardization can assist in improving HPV vaccination. This would include incorporating evidence-based data and strategies into protocols and proper provider training (Cunning-Erves et al, 2022).

Some parents reported that pediatric providers did not stress the importance of HPV vaccination or even mention it in a wellness exam. In contrast, other parents said they felt the provider was pushing the vaccine and not giving the parent the information to make an informed decision (Beavis et al., 2022).

In Vue et al. (2020), providers mentioned time limitations during visits, a lack of provider knowledge about the vaccine and guidelines, and a lack of vaccine confidence. Similarly, parents reported there was not enough time in their visit to discuss their concerns about the vaccine (Beavis et al., 2022). Overall, parents wanted more information to make the right decision for their child and time to discuss with their provider (Beavis et al., 2022).

Another barrier that was identified in the NIS survey was a lack of trust in the provider. Interestingly, 12.8% reported that they did not believe their adolescent providers were a trusted source for vaccine information (Nguyen et al., 2021).

Dempsey et al. (2018) discussed a study in which they evaluated the effectiveness of providing HPV information sheets to each practice population. They also utilized motivational interviewing if patients were resistant to vaccination. The conclusion from the study reported that the fact sheets and communication training were practical intervention methods when promoting HPV vaccination (Dempsey et al., 2018). Widman et al. (2018) expressed the importance of

dialogue with parents, such as emphasizing the potential of cancer prevention with HPV vaccine administration.

Parental vaccine hesitancy can be frustrating to the provider. However, there are some instances in which parents decide to vaccinate through secondary decisions. This can be done through high-quality provider recommendations and follow-up counseling at subsequent visits. Kornides et al. (2018) conducted a survey exploring secondary acceptable after the initial decline of the HPV vaccine. In the survey, 45% of parents reported secondary acceptance of the HPV vaccine. The study stated that secondary acceptance was reached after the parents received follow-up counseling about the HPV vaccine from an HCP. The parents reported several reasons for secondary acceptance, including receiving high-quality provider recommendations, their child getting older, and obtaining more education about the HPV vaccine (Kornides et al., 2018). Providers need to recognize the relationship between weak recommendations and decreased vaccination rates. The providers who displayed confidence and knowledge about the vaccine had increased vaccine uptake (Nguyen et al., 2021).

Social Media Misinformation

Social media has a tremendous influence on the general population, but especially the adolescent population (Kornides et al., 2023). Kornides et al. (2023) conducted a retrospective content analysis to determine how much misinformation and disinformation was presented regarding the HPV vaccine. They collected data on misinformation posted on Twitter from December 15, 2019, through March 31, 2020. They had a total of 3,876 #HPV Tweets in the English language. The analysis found that 76% of Tweets contained support and education for the HPV vaccine. However, they found that 24% of the Tweets had misinformation or disinformation. The disinformation and misinformation were then broken down into three

prevalent categories. This included misinformation about mandatory vaccination (19%), adverse health effects (59%), and inefficacy of the HPV vaccine (14%). The most common adverse health effects Tweeted included death at 23% and non-specific injury at 51%. The Tweets that contained incorrect information were 5.44 times more likely to be retweeted. The analysis concluded that almost one-quarter of the information on #HPV had misinformation or disinformation. The Tweets that contained this type of information were found to attract more retweets and likes on the social media platform.

Instagram is one of the most popular and widely used social media platforms with over one billion users. It has become a forum for discussing and debating health-related topics, including HPV. It has also gained popularity in the anti-vaccination movement. Most Instagram users are approximately the age that the HPV vaccine is indicated. Troiano and Nardi (2022) reported that out of 510 Instagram posts regarding HPV vaccination, 55.8% of posts were pro-vaccine, but the posts involving anti-vaccination had more likes on the post and received more attention. These anti-vaccine posts had less information about HPV and cancer prevention than pro-vaccine posts. Also, the posts that involved only young females were more likely to be pro-vaccination. The study stresses the importance of healthcare professionals' awareness of the impact of social media (Troiano, G., & Nardi, A., 2022).

Young people, including adolescents, are becoming more involved in healthcare decisions. TikTok is a social media network that has been increasing in popularity, and 70% of TikTok users are between the ages of 13 and 24. HPV vaccination is now recommended in early adolescence through the age of 26 years old. Boatman et al. (2022) focus on understanding the interactions and messaging of the HPV vaccine on TikTok. Social media platforms could help reach the adolescent population with accurate and vital health information. A cross-sectional

study was performed using 170 of the top TikToks that were focused on the HPV vaccine and were searched using hashtags that included #hpvshots, #gardasil, #hpvawareness, #hpv, and #gardasil shot. TikToks that were evaluated were only in the English Language. Out of the 170 TikToks analyzed, 71.1% were created by women compared to men. Boatman et al. (2022) also note that 58.8% of TikTok users are women. The study found that 53.5 % of the TikToks contained pro-vaccine information. However, the TikToks that involved more user interactions and comments involved anti-vaccine information, which only accounted for 16.4% of the TikToks analyzed. Thirty percent of the TikTok videos had no opinion on pro-vaccine or anti-vaccine. The pro-vaccine content focused on cancer and prevention and provided science-based information. The anti-vaccine TikToks focused on the side effects of the HPV vaccine. An interesting finding was that healthcare professionals created 30% of all top TikToks that focused on education regarding HPV and the vaccine. Sixty-three percent of other TikTok content contained personal experiences with the vaccines and mentioned side effects. Healthcare professionals must address concerns related to HPV side effects that are shared on social media. This study shows the importance of healthcare professionals' social media interaction to combat misinformation. The study did conclude that there is a need for further research to understand the impact of science-based vaccine information on social media (Boatman et al, 2022).

Summary of Literature

The HPV vaccination is optional but recommended in childhood. However, vaccination rates among young children and adolescents are still below goal (Shapiro, 2022). The three main concepts presented in the literature review are parental vaccine hesitancy, weak provider recommendations, and social media misinformation. These concepts were identified in numerous articles about the barriers to HPV vaccination.

The first concept was parental hesitancy related to the HPV vaccine. The review of the literature was consistent in that parental hesitancy was mainly attributed to the lack of knowledge about the HPV vaccines and parents were concerned about the potential side effects of the vaccine. Some studies found that parents were concerned that their child was too young for vaccination because they were not yet sexually active.

Weak provider recommendations were the second concept identified in the review of the literature. In some of the studies, the providers reported they did not have enough time with their patients to explain the benefits of vaccination. Btoush et al. (2022) state that providers' beliefs and knowledge about HPV affect vaccine recommendations. Other common findings in studies mentioned HCPs' low self-confidence to address the concerns of parents (Cunningham-Erves et al., 2022). The literature review's findings surrounded the lack of knowledge regarding HPV and vaccination.

The third and last concept was social media misinformation. Social media platforms include Twitter, Instagram, and TikTok, which are all popular among the adolescent population. The research findings concluded there is both accurate educational information and misinformation. However, the social media content that contained misinformation received more attention, views, and likes than content with positive or correct information. Furthermore, social media could be an essential platform for healthcare providers to get information out to this population.

Research and information on the positive impact of the HPV vaccination are readily available. The goal is to identify the barriers and provide strategies to educate parents and healthcare providers. Social media platforms could also be positively used as a source of information supporting HPV vaccination.

SECTION 3: Discussion and Synthesis

Vaccination is a method used to prevent illness and now can be used to prevent cancer. HPV contributes to numerous diseases and increases the rate of cancer. Treating HPV-related diseases and cancers is also a costly burden.

The review of the literature identified many barriers that contribute to suboptimal vaccination rates. The three main concepts identified were consistent throughout the literature review and supported the purpose statement of this paper. The grey literature presented supports the impact that HPV has on the population and how HPV causes cancer and disease. Practice change is needed so that parents and adolescents can understand the importance of HPV vaccination and view it just as important as other routine childhood vaccines. The strengths are that the findings were consistent throughout the review of the literature, such as parental hesitancy being a barrier to vaccine uptake. Also, social aspects, such as the impact of weak provider recommendations, and social media can affect vaccine uptake (Nguyen et al., 2021). Overall, HPV vaccination is being implemented, but there is still room for improvement to meet vaccination goals. Limitations of research had a lower level of participation in some of the studies such as Cunningham-Erves et al. (2022) and Rosen et al. (2020). The NIS was the most impactful survey giving information on the impact of parental hesitancy (Nguyen et al., 2021). Increased participation is essential when collecting data to impact future research and change. We need more data on effective methods of improving communication to encourage increased vaccine uptake. Other limitations noted in the review of the literature were concerning culture and geographic locations.

This capstone paper helped me recognize the barriers to certain preventative practices, such as vaccination. It also helped me focus on ways to expand my knowledge and learn the

importance of effective communication. Effective communication can strengthen the relationship between the provider, patients, and parents (Nguyen et al., 2021).

Implications for Advanced Nursing Practice

Oncology nursing has been my focus and passion for the last eight years of my career. When selecting a topic, I wanted to present literature that would impact my peer's future practice. The best way to reduce the disease and cancer burden is by prevention. "Cancers caused by HPV are largely preventable (Shapiro, 2022, p. 3781)." There are many methods of cancer prevention such as diet, exercise, and cessation of harmful substances such as smoking. However, we now have vaccination as a method of cancer prevention. The HPV vaccination given according to recommendations during the adolescent period can prevent HPV. Those who are vaccinated before HPV exposure will have a 97% vaccine effectiveness for preventing cervical cancer and cell changes that could become cancer. Also, getting vaccinated before exposure has almost 100% effectiveness in genital wart prevention (Deak, 2023)

Advanced practice nurses (APNs) can use this information to understand the importance of HPV vaccination in the adolescent population. The APN needs to be knowledgeable about the impact of vaccination in preventing diseases and its effect on the healthcare system. Chesson et al. (2018) estimated the lifetime medical cost of the disease caused by HPV infections in 2018 was 774 million dollars. The article reports that this is lower than previous estimates due to the impact of the HPV vaccine and could decrease as more people choose vaccination (Chesson et al., 2018). Since the vaccine was launched in 2006, there have been promising results related to reducing the health burden of HPV. A study published by Chesson et al. (2018) predicts that increased compliance with the HPV vaccine at the recommended age of 11 or 12 will continue to

reduce cases of HPV. Also, catching up with vaccination through age 26 will continue to decrease the disease burden and cost of HPV infection (Chesson et al., 2018).

A barrier to HPV vaccine compliance is the completion of the HPV series. Kamineni et al. (2021) reported that the multiple-dose regime can hinder completion. Reasons cited in the survey for not completing the series included not being aware of the need for additional vaccines, forgetting to return for additional doses, and the inconvenience of returning for additional vaccines. Adolescents who initiate the vaccine at ages 9 to 14 require a two-dose series. Patients ages 15 and older who begin the vaccine require a three-dose series. There are currently no recommendations or data available for implementing fewer doses. HCPs must ensure the parents understand follow-up (Kamineni et al, 2021). Vu et al. (2020) suggest having the parent schedule a follow-up appointment for the next vaccination so that it is not forgotten.

The HPV vaccine has been proven safe. There have been more than 135 million doses given in the United States since it was released in 2006. Like any medical treatment or vaccine, the HPV vaccine can have side effects. The most common side effects reported include mild pain, redness, and swelling at the injection site. Other side effects include nausea, headache, dizziness, and fainting. Fainting with any vaccine that includes the HPV vaccine is more common in the adolescent population (CDC, 2021b). This information is easily accessible and can be presented in education with parents of adolescents.

Weak provider recommendations were a barrier to HPV vaccination and a concept for this capstone. Practice changes can start with education on the provider level. HCPs and their organizations can also get involved in social media campaigns to increase positive information to promote HPV vaccination. Vaccine safety was a concern among parents in the review of the

literature. Sharipo (2022) reports that serious side effects of the HPV vaccine are rare. These are essential areas to research and provide evidence for the patients and their parents.

Additional information that could be useful in providing parents with includes the long-lasting protection of the HPV vaccine. In the initial studies of the HPV vaccine, vaccine participants were followed for approximately twelve years post-vaccination. The data reported that protection against HPV remained high, and there was no evidence that the vaccine's effectiveness decreased over time. Also, fewer women are developing precancerous cervical changes (CDC, 2021b).

The HBM theoretical framework focuses on promoting healthy behaviors and preventative care. Vaccination is essential for the prevention of disease. There are a few different strategies for health promotion that include incorporating fact sheets and motivational interviewing.

The HPV vaccine is essential for adolescents and adults to decrease the disease and financial burden of HPV. HPV vaccination can also reduce the strain on oncology services. Vaccination is a simple action for disease prevention. The information provided in this paper displays the importance that the HPV vaccine plays in disease prevention. The most significant area of healthcare this can impact is the oncology world because this vaccine could drastically reduce the cancer burden. Vaccination can also reduce the financial burden of diseases and cancer caused by HPV. The most important takeaway is that lives can be saved through HPV vaccination.

Recommendations for Future Research

In the review of the literature, there was a brief mention of ethnicity and socioeconomic status related to HPV vaccination and disease prevention. Sharipo (2022) states that there is a need for further research concerning geographical region, ethnicity, and health behaviors.

Further research is also needed on individual, organizational, and community-level interventions. Individual factors concern how peer influence affects adolescent's beliefs. Organizational interventions could be a school-based intervention program promoting vaccinations (Peterson et al., 2020). School-based health centers and school nurses can play a role in vaccine compliance. School nurses can impact meeting educational needs for recommendations of HPV vaccination and can be used as a platform for educating adolescents on HPV. Future research for school-based interventions can identify strategies that include interactive educational activities. This can be used to determine the impact of vaccination rates in this setting (Rose et al., 2020). A community-level intervention would be provider training interventions (Peterson et al., 2020). Likewise enrolling in a community pharmacy would be a community-level intervention in a rural setting. Daniel et al. (2021) performed a pilot study demonstrating the value and effectiveness of community pharmacy involvement in vaccine administration in a rural setting to increase vaccine uptake. Further research would be beneficial if these services could increase vaccine uptake in rural areas across the county (Daniel et al., 2021).

Implementation studies are needed to evaluate the effectiveness of interventions for different levels of hesitancy. Studies like these could identify the hesitant group with the most significant impact on vaccination rates. If these hesitant groups are identified then more specific interventions can be tailored to reach the Healthy People 2030 goals (Rositch et al., 2022).

Research in areas of high vaccine compliance would also be beneficial to assess their strategies and implementation measures to determine what is effective (Vickers et al., 2019). The provider should seek creative ways to reach this population to improve vaccination rates (Vickers et al., 2019).

Conclusion

Approximately 75-80% of sexually active people will contract HPV during their lifetime (Shapiro, 2022). HPV is responsible for genital warts and certain cancers that impact the disease burden in the United States (Shapiro, 2022). The HPV vaccine given during adolescence can help prevent disease and decrease cancer rates. In addition, the HPV vaccination has the potential to eliminate cervical cancers caused by HPV worldwide. Increased vaccination rates are imperative to contain the infection and potentially eliminate it ((Troiano, G., & Nardi, A., 2022). However, vaccination rates are suboptimal due to many factors. Those mentioned in this capstone paper include parental vaccine hesitancy, weak provider recommendations, and social media misinformation. HCPs can help break down these barriers by better understanding the importance of vaccination and educating parents.

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Vu, M., King, A., Jang, H., & Bednarczyk, R. (2020). Practice, provider, and patient level facilitators of and barriers to HPV vaccine promotion an uptake in Georgia: A qualitative study of healthcare providers' perspectives. *Health Education Research, 35*(6), 512-523.

Widman, C., Rodriquez, E., Saad-Harfouche, F., Twarozek, A., Erwin, D., & Mahoney, M. (2018). Clinician and parent perspectives on educational needs for increasing adolescent HPV vaccination. *Journal of Cancer Education, 33,* 332-339.

Appendix

Matrix					
Reference	**Research Question Purpose Objective Hypothesis**	**Patients Population Sample**	**Comparisons**	**Outcomes Findings**	**Level of Evidence and Quality Grade**
Beavis, A., Meek, K., Moran, M., Fleszar, L., Adler, S., & Rositch, A. (2022). Exploring HPV vaccine hesitant parents' perspectives on decision-making and motivators for vaccination. *Vaccine,12*, https://doi.org/10.1016/j.jvacx.2022.100231.	The purpose of this study was to assess strategies vaccine-hesitant parents perceive as most likely to vaccinate their children against HPV.	N=1501 individuals were invited to participate in a survey. 50 completed the survey. 31 of the 50 were eligible. 22 interviews were completed. 77% were female 50% were non-Hispanic White 36% were African American	Reasons for not vaccinating for HPV and strategies to motivate vaccination.	Barriers to vaccinate included concern about side effects, children perceived as not susceptible, dissatisfaction with pediatric encounters. Strategies to motivate parents to vaccinate include strengthening information communication, discussion with other parents, optimizing the pediatrician encounter	Qualitative Study Level III Grade B

Matrix					
Reference	**Research Question Purpose Objective Hypothesis**	**Patients Population Sample**	**Comparisons**	**Outcomes Findings**	**Level of Evidence and Quality Grade**
Boatman, D., Eason, S., Conn, A., & Kennedy-Rea, S. (20220). Human papillomavirus vaccine messaging on TikTok: Social media content analysis. *Health Promotion Practice, 23*(3), 382-387.	The of aim of the study was to understand the interactions and messaging of HPV vaccine. This information could be used to form strategies to reach young people with important messages concerning health.	N= 170 top TikToks that focused on the HPV vaccine. 71% created by women	Compared TikToks that were pro-vaccine versus antivaccine. It also compared which posts got the most user interaction.	Most TikToks that were posted were pro-vaccine. However, the TikToks that received the most user interactions were posts with anti-vaccine information presented. The pro-vaccine posts focused on cancer prevention and the anti-vaccine posts focused on side effects.	Cross-Sectional Study Level III Grade A

Matrix					
Reference	**Research Question Purpose Objective Hypothesis**	**Patients Population Sample**	**Comparisons**	**Outcomes Findings**	**Level of Evidence and Quality Grade**
Btoush, R., Kohler, R., Carmody, D., Hudson, S., & Tsui, J. (2022). Factors that influence Healthcare provider recommendations of HPV vaccination. *American Journal of Health Promotion, 36*(17), 1152-1161.	This study looked at factors associated with HCP recommendation of HPV vaccination for adolescents.	N=390 that included nurse practitioners and physicians. 75% were physicians 25% were nurse practitioners 62% specialized in pediatrics 20% family medicine 18% women's health	Recommendations for younger adolescents versus older adolescents Comparing patient demographics. Comparing knowledge level with likelihood to recommend vaccination.	The interventions need to focus on HCPs improving their knowledge about the HPV vaccine and use strategies to facilitate vaccination. Also, to reduce concern about vaccine side effects.	Cross-Sectional Study Level III Grade A

Reference	Research Question Purpose Objective Hypothesis	Patients Population Sample	Comparisons	Outcomes Findings	Level of Evidence and Quality Grade
Chesson, H., Laprise, J., Brisson, M., Martin, D., Ekwueme, D., & Markowitz, L. (2018) The estimated lifetime medical cost of disease attributable to human papillomavirus Infections acquired in 2018. *Centers for Disease Control and Prevention, 48*(4), 1-15.	The estimated lifetime medical costs of diseases caused by the HPV infection that was acquired in 2018.	Estimated lifetime medical costs attributable to HPV infections in 2018. Ages 15-29 years old	Comparing medical costs in 2018 versus previous medical costs.	Costs are lower than in previous studies prior to vaccination. With increased vaccination, this is expected to decrease.	Quantitative Study Level III Class B
Coatche-Condor, C., Peterson, M., & Asare, M. (2022). Application of theoretical frameworks on human papillomavirus vaccine interventions in the United States: Systematic review and meta-analysis. *Cancer Causes & Control, 33*, 15-24.	Using a theoretical framework to implement future studies and promote behavioral change.	N=3,141 articles found through a database search that include PubMed, EMBASE, ERIC, CINAHL, Academic Search Complete, Scopus, Web of Science, & PsycINFO	The most used theories included the Health Belief Model, Motivational Interviewing, Theory of Planned Behavior, and Information-Motivation Behavioral Skills	Results of the study indicated that the use of theory application to HPV vaccination is still in the developmental phase.	Systematic Review & Meta-Analysis Level III Class B

Reference	**Research Question Purpose Objective Hypothesis**	**Patients Population Sample**	**Comparisons**	**Outcomes Findings**	**Level of Evidence and Quality Grade**
Cunningham-Erves, J., Hull, P., Wilkins, C., Edwards, K., Davis, M., Jones, J., Graham, J., Adekunle, A., & Dempsey, A. (2022). Healthcare providers' practice protocols, Strategies, and parental HPV vaccine hesitancy: An exploratory study. *HPV Vaccines & Immunotherapeutics, 18*(6), 1-11.	The purpose was to explore provider strategy, practice protocols, and perceived tools needed to address parents who were vaccine-hesitant. This was during the COVID-19 pandemic.	N= 19 providers were screened 4 providers did not complete the interview 66.7% of providers were White 73.3% female 88.6% pediatric providers 66.7 practiced in an urban area	Comparing findings from interview questions & strategies for vaccine hesitant parents.	The study findings suggest the need for a protocol for providers to address hesitant parents to improve HPV vaccination.	Qualitative Semi-Structured Interviews Level III Class C

Reference	**Research Question Purpose Objective Hypothesis**	**Patients Population Sample**	**Comparisons**	**Outcomes Findings**	**Level of Evidence and Quality Grade**
Daniel, C., Lawson, F., Vickers, M., Green, C., Wright, A., Coyne-Beasley, T., Lee, H., & Turberville, S. (2021). Enrolling a rural community pharmacy as a vaccine for children provider to increase HPV vaccination: A feasibility study. *BMC Public Health, 21*, 1-10.	This pilot study was implemented to see the impact that a community pharmacy could have in a rural area for HPV vaccine uptake.	N= 1 rural pharmacy clinic in Alabama 89 adolescents vaccinated 55 doses of HPV vaccine given 166 total vaccines given in an 8 month period.	Comparing the impact of a rural pharmacy in vaccine uptake.	The increase in total vaccination administration was 158.8% Pharmacies in a rural setting have the potential to increase vaccine uptake.	Mixed-Methods Study Level 1 Class B

Reference	**Research Question Purpose Objective Hypothesis**	**Patients Population Sample**	**Comparisons**	**Outcomes Findings**	**Level of Evidence and Quality Grade**
Dempsey, A., Pyrznawoski, J., Lockhart, S., Barnard, J., Campagna, E., Garrett, K., Fisher, A., Dickinson, M., O'Leary, S. (2018). Effect of a health care professional communication training intervention on adolescent human papillomavirus vaccination: A cluster randomized clinical trial. *JAMA Pediatrics, 172*(5), 1-9.	The objective was to evaluate the effect of HPV vaccine communication intervention on vaccination in the adolescent population.	N= 16 primary care practices located in Denver, Colorado 188 medical professionals 43, 132 adolescents	The use of fact sheets, a tailored parent educational website, a set of HPV-related images, and 2.5 hours of communication training versus control practices.	Adolescents in the intervention practices had higher odds of HPV vaccine initiation and completion than those in the control practices.	Cluster Randomized Clinical Trial Level I Class A

Reference	**Research Question Purpose Objective Hypothesis**	**Patients Population Sample**	**Comparisons**	**Outcomes Findings**	**Level of Evidence and Quality Grade**
Kamineni, A., Blasi, P., Gundersen, G., Oliver, M., Dunn, J., Galloway, D., & Madeleine, M. (2021). Barriers to human papillomavirus vaccines series completion among insured Individuals in an integrated healthcare setting. *Infectious Disease: Research and Treatment, 14*, 1-8.	This pilot study was to look at barriers to HPV vaccine series completion.	N= Parents or legal guardians of 11-17-year-old 10 girls 18 boys N=18-31-year-olds 20 women 9 men	Comparing different ages & then gender.	Barriers included not being aware of the need for additional doses (28.6%) & inconvenience of returning for additional doses (17.9%) HCP play an important role on raising awareness for need of additional doses	Cross-Sectional Study Level III Grade B

Reference	**Research Question Purpose Objective Hypothesis**	**Patients Population Sample**	**Comparisons**	**Outcomes Findings**	**Level of Evidence and Quality Grade**
Kornides, M., Badlis, S., Head, K., Putt, M., Cappella, J., & Gonzalez-Hernadez, G. (2023). Exploring content of misinformation about HPV vaccine on Twitter. *J Behav Med, 46*, 239-252.	The purpose was to identify connect and the frequency of disinformation and misinformation about the HPV vaccine. This was using the social media platform of Twitter between 12/15/2019 to 3/31/2020.	N= 5342 Tweets containing information about the HPV disease and vaccine.	Comparing Tweets with disinformation and misinformation with their audience engagement.	Approximately one-quarter of #HPV Tweets contained misinformation and disinformation. These Tweets got a h	Retrospective Content Analysis Level III Grade A

Reference	**Research Question Purpose Objective Hypothesis**	**Patients Population Sample**	**Comparisons**	**Outcomes Findings**	**Level of Evidence and Quality Grade**
Kornides, M., McRee, A., & Gilkey, M. (2018). Parents who decline HPV vaccination: Who later accepts and why. *Academic Pediatrics, 18*(2), 37-43.	The purpose of this study was to characterize parents secondary acceptance of the HPV vaccine.	N= 494 online survey of parents with children ages 11 to 17 years. These parents had reported previously declining HPV vaccination for their children.	Comparing reasons for secondary acceptance that included follow-up education, parents reporting children getting older, and provider recommendation.	45% of parents reported secondary acceptance of the HPV vaccination. The secondary acceptance was associated with follow-up counseling and education about HPV and vaccination by a HCP. HCP should provide repeated high-quality recommendations for vaccination.	Cross-Sectional Study Level III Grade B

Reference	**Research Question Purpose Objective Hypothesis**	**Patients Population Sample**	**Comparisons**	**Outcomes Findings**	**Level of Evidence and Quality Grade**
McKenzie, A., Shegog, R., Savas, L., Healy, M., Shay, A., Preston, S., Coan, S., Teague, T., Frost, E., Spinner, S., & Vernon, S. (2023). Parents' stigmatizing beliefs about the HPV vaccine and their association with information-seeking behavior and vaccination communication behaviors. *Human Vaccines & Immunotherapeutics, 19*(1), 1-9.	The purpose of this study is to describe associations between parents' intentions to vaccinate, their stigmatizing beliefs about HPV vaccination, and psychosocial related to vaccination.	N=512 parents that had vaccine eligible children	Parents stigmatizing beliefs and fear of promotion of sexual activity as barriers to vaccination.	This study found that stigmatizing beliefs do impact HPV vaccination and may also discourage parents from seeking any information about the vaccine.	Cross-Sectional Study Level III Grade B

Reference	**Research Question Purpose Objective Hypothesis**	**Patients Population Sample**	**Comparisons**	**Outcomes Findings**	**Level of Evidence and Quality Grade**
Nguyen, K., Santibanez, T., Stokley, S., Lindley, M., Fisher, A., Kim, D., Greby, S., Srivastav, A., Singelton, J. (2021). Parental vaccine hesitancy and its association with adolescent HPV vaccination. *Vaccine, 39*(17), 1-18.	This study evaluates the link between parental vaccine hesitancy and receipt of HPV vaccination.	2018 NIS Teen Study N=4,199 parents of adolescents 2019 NIS Teen Study N=4,903 parents of adolescents	Parental Hesitancy to the HPV Vaccine NIS Teen Study 2018 & 2019	17.6% of parents reported being hesitant toward adolescent vaccination 15.6% were concerned about the number of vaccines given at one time 12.2% knew someone with long-term serious side effects 12.8% did not believe their HCP was a trusted source for vaccine information The parents who trusted their HCP were more likely to vaccinate.	Cross-Sectional Study Level III Grade A

Reference	Research Question Purpose Objective Hypothesis	Patients Population Sample	Comparisons	Outcomes Findings	Level of Evidence and Quality Grade
Peterson, C., Silva, A., Holt, H., Balanean, A., Goden, A., & Dykens, J. (2020). Barriers and Facilitators to HPV vaccine uptake among US rural populations: A scoping review. *Cancer Causes & Control, 31*, 801-814.	This study evaluated the barriers to vaccination in rural settings.	N=1,083 abstracts reviewed 13 articles met the inclusion criteria.	This study compared vaccination rates in urban versus rural settings. It also looked at the barriers to vaccination in rural settings.	Additional research is needed on an organizational, interpersonal, and community level. Vaccination rates are lower in rural settings when compared to urban settings.	Cross-Sectional Study Level III Grade B
Rosen, B., Real, F., Bishope, J., McDonald, S., Klein, M., Kahn, J., & Kreps, G. (2020). School health service provider perceptions on facilitated interactive role-play around HPV vaccine recommendation. *Journal of Cancer Education, 37*, 1286-1295.	The purpose of this study was to assess interventions such as interactive role-playing activities to increase HPV vaccination. This was facilitated by a school-based health care center.	N=16 participants completed the workshop and completed the survey.	Comparing educational intervention in the school setting to increase awareness and impact vaccination.	Findings from the study indicated that educational strategies and material can help increase awareness and increase vaccination rates.	Mixed-Methods Level III Grade B

Rositch, A., Liu, T., Chao. C., Moran, M., & Beavis, A. (2022). Levels of parental HPV vaccine hesitancy and their reasons for not intending to vaccinate: Insights from the 2019 national immunization survey-teen. *Journal of Adolescent Health, 71*(1), 39-46.	The purpose is to understand HPV vaccine hesitancy to form effective interventions to reach HPV vaccination goals in the United States.	N=13,090 parents with unvaccinated children	Examined parents with children ages 13-17 years who had not started the HPV vaccination series. Utilized the 2019 National Immunization Survey- Teen.	Out of the parents surveyed 63% were hesitant. The study found that parents who received provider recommendations for vaccination were more confident to vaccinate.	Cross-Sectional Study Level III Grade A
Troiano, G., & Nardi, A. (2022). Instagrammers' attitude towards human papillomavirus (HPV) Vaccine: A review. *Journal of Human Behavior in the Social Environment, 32*(2), 274-282.	The aim of this study was to determine the attitudes towards HPV vaccination with Instagram users.	N= 510 Instagram Posts	This study compared pro-vaccine posts and anti-vaccine posts.	55.8% of posts were pro-vaccine. Anti-vaccine posts had significantly more follows and likes than pro-vaccine posts.	Mixed-Methods Study Level III Class A

Reference	**Research Question Purpose Objective Hypothesis**	**Patients Population Sample**	**Comparisons**	**Outcomes Findings**	**Level of Evidence and Quality Grade**
Vickers, M., Green, C., Lee, H., Pierce, J., & Daniel, C. (2019). Factors associated with HPV Vaccination uptake and HPV-associated cancers: A county-level Analysis in the state of Alabama. *Journal of Community Health*, *44*, 1214-1223.	The study's aim was to identify areas in Alabama that need interventions to increase vaccination rates.	N=67 counties in Alabama 40 counties or 59.7% have poverty rates above the state average of 18.4% 65 counties or 97.0% have poverty rates exceeding the national average of 12.7%	Comparing different counties vaccination rate in the state of Alabama.	Alabama ranks 15th in the U.S. for HPV cancer rates. Interesting finding is that the counties with the highest vaccination rate rates for HPV vaccination were in a lower socioeconomic area and mostly African American. These counties also had the highest rates of HPV cancers. This indicates a link between perceived susceptibility and the desire to get vaccinated.	Mixed-Methods Study Level III Class A

Reference	**Research Question Purpose Objective Hypothesis**	**Patients Population Sample**	**Comparisons**	**Outcomes Findings**	**Level of Evidence and Quality Grade**
Vu, M., King, A., Jang, H., & Bednarczyk, R. (2020). Practice, provider, and patient level facilitators of and barriers to HPV vaccine promotion an uptake in Georgia: A qualitative study of healthcare providers' perspectives. *Health Education Research, 35*(6), 512-523.	The purpose of this study is to assess patient and provider factors that impact health behaviors regarding the uptake of the HPV vaccine.	N= 55 providers in Georgia	Compare different barriers to vaccination and methods to increase vaccine up take in Georgia.	Several suggestions were provided in the study for vaccine promotion. These include to use of vaccine registries, utilizing technology for education, and improving practice information change.	Mixed-Methods Level III Class B

Reference	**Research Question Purpose Objective Hypothesis**	**Patients Population Sample**	**Comparisons**	**Outcomes Findings**	**Level of Evidence and Quality Grade**
Widman, C., Rodriquez, E., Saad-Harfouche, F., Twarozek, A., Erwin, D., & Mahoney, M. (2018). Clinician and parent perspectives on educational needs for increasing adolescent HPV vaccination. *Journal of Cancer Education*, *33*, 332-339.	This study interacted with adolescent parents and clinicians to identify barriers in a focused geographic region.	N= 134 individuals approached 60 participants completed interviews 52 were clinicians	This study interviewed parents and clinicians to identify barriers to vaccination	Methods to promote HPV vaccination include educational campaigns that target both parents and healthcare professionals.	Mixed- Method Study Level III Class B