

DNP Executive Summary

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Problem Statement

Despite the availability of a vaccine as well as its proven efficacy in cancer prevention, many parents and adolescents are hesitant to get the human papillomavirus vaccination leading to low HPV vaccination rates around the country.

Significance

Human papillomavirus (HPV) are pathogens that can cause cancers of the cervix, vulva, vagina, anus, penis, mouth and throat as well as genital warts. The American Cancer Society (2019) estimates that 13,800 new cases of cervical cancer will be diagnosed and around 4,290 women will die from cervical cancer in the United States in 2020. In the most recent study published by the National Cancer Institute in 2015, 91% of cervical cancers were caused by HPV (Sariya et al, 2015). This would mean that approximately 12,558 newly diagnosed cases and 3,904 deaths in the United States 2020 will be due to the human papillomavirus.

Current HPV vaccination rates based on the most recent National Immunization Survey completed in 2017 show that 48.6% of adolescents in the United States aged 13-17 years of age have completed the HPV vaccine series (Walker et al, 2018). Much of the research available suggests that lack of vaccination recommendation by a healthcare provider or lack of overall education on the vaccine are the main reasons for low vaccination rates (Holman et al, 2014, Holman et al, 2014, Healy & Pickering, 2011 & Dela Cruz et al., 2017). Healthcare providers can provide critical information that produces a high impact on decisions to vaccinate and it is critical that our healthcare practitioners feel prepared to provide an effective recommendation and educate their patients about the vaccine. Many recent studies have shown that providing educational sessions on how to effectively recommend the HPV vaccine as well as successfully communicating with parents and adolescents can show significant improvements in HPV vaccine

rates (Austin & Morgan, 2019; Rand et al., 2018; Rand et al., 2018). The purpose of this study was to evaluate the effectiveness of an HPV educational session on provider recommendation practices.

Methodology

Using Shewart and Demings Plan, Do, Study, Act framework for quality improvement projects (Taylor et al., 2014), the researcher planned and presented a 20 minute educational PowerPoint presentation created by the Center for Disease Control in 2017 as part of the “You Are the Key to Cancer Prevention” campaign (CDC, 2017). The intervention was presented to 10 pediatricians and 6 pediatric nurse practitioners in the pediatric department at IU Health Arnett on January 17, 2020, and 7 family medicine physicians and 4 family nurse practitioners in the family medicine department at IU Health Arnett on February 7, 2020.

Provider recommendation practices were evaluated pre intervention January 2020 with an 8-item provider survey, created by the researcher, that was emailed as well as handed out in person to eligible healthcare providers to assess provider’s initial HPV recommendation practices. HPV recommendation practices were also assessed post educational intervention using the same survey used pre-intervention which was distributed via email in March 2020 and again in May 2020. Parental surveys, which were also created by the researcher, were distributed via clinic staff to parents of eligible HPV eligible patients and were collected in the clinics to assess receipt of the HPV vaccination as well as provider recommendation practices from January 20, 2020, to April 1, 2020. Both provider and parental survey data were entered into RedCap, a secure online database. Lastly, overall HPV vaccination rates for all of both clinics were requested via IU Health Arnett and pulled monthly data from January 2019 to March 2020 and

assessed the percentage of patients aged 9-17 years of age that were seen in the clinic those months and had received at least one HPV vaccine.

The Statistical Package for the Social Sciences (SPSS) version 22 was used for analysis. An independent-sample t-test was run to determine the primary outcome of whether or not providers' recommendation practices changed from the pre to post-survey. Chi-squared tests were then run to see if there was any association between demographic characteristics of the patients and receipt of the vaccine as well as any associations between the type of provider and vaccine acceptance and recommendation. Additionally, chi-squared tests were run to determine if there was any statistically significant difference between the 2019 HPV vaccine rates and the 2020 HPV vaccine rates for both the pediatric and family medicine clinics.

Results

This project was implemented over 5 months from January 2020 to May 2020. A total of 17 healthcare providers took the pre-survey including 4 pediatric nurse practitioners, 6 pediatric MDs, 3 family medicine nurse practitioners, and 4 family medicine MDs with 11 of the providers having 15 or more years of experience. This compares to 22 healthcare providers that took the post-survey including 7 pediatric nurse practitioners, 8 pediatric MDs, 4 family medicine nurse practitioners, and 3 family medicine MDs with 11 of the providers having 15 or more years of experience. Overall provider recommendation practices remained unchanged from pre to post-survey as seen in Table 1. However, a higher comfort level was reported post-intervention, as demonstrated by a 9.3 out of 10 in the question "How comfortable do you feel answering questions that patients and parents may have about the HPV vaccine?" compared to a reported 9.1 out of 10 pre-intervention.

The overall HPV vaccination rate for 2019 in the pediatric department was 7.9%.

This is further broken down into monthly HPV vaccination rates for patients aged 9-17 which can be seen in Table 2. A total of 1278 patients were seen in the pediatric department in January 2020, 1117 were seen in February 2020 and 770 were seen in March 2020. An increase was seen in the pediatric clinics of children receiving at least one dose of the HPV vaccine from 13.9% (n=178) in January 2020 to 14.5% (n=162) in February 2020. A slight decrease in HPV vaccination rates was seen from February 2020 (14.5%) to March 2020 (11.7%). These rates can be compared to total HPV vaccination rates in January 2019 (7.1%), February 2019 (8.6%) and March 2019 (6%), a 6.8% increase in January (p=0.000), 5.9% increase in February (p=0.000) and a 5.7% increase in March (p=0.002). Additionally, when grouping overall vaccine rates by the healthcare provider, pediatric MDs saw an increase from January to March whereas the pediatric NPs saw a decrease over the three months.

The overall HPV vaccination rate for the family medicine clinic in 2019 was 8.5%. Compared to the pediatric clinic, the family medicine clinic saw significantly fewer patients in January 2020 (n=91), February 2020 (n=85), and March 2020 (n=80). Each month in 2020 saw a decrease of patients receiving at least one dose of the HPV vaccine from 11% (n=10) in January, 7.1% (n=6) in February, and 6.3% (n=5) in March. These can again be compared to the total HPV vaccination rates in January 2019 (2.4%), February (1.3%) and March (6.7%), an 8.6% increase in January, 5.8% increase in February (p=0.077) and a 0.5% decrease in March (p=0.912).

Parental surveys evaluated the recommendation practices of the providers throughout the data collection period. 25 of the 34 surveys returned (71.4%), stated that they did receive the HPV vaccine at their clinic visit and for those that did not receive the vaccine parental decline was the most popular response for non-vaccination (n=6). Furthermore, 29 out of the 34, or

82.9% of the surveys returned stated that they did receive a recommendation from the healthcare provider for the HPV vaccine at their clinic visit. The surveys also showed that oral communication was the most popular form of education (60%) from the providers followed by written (8.6%) and/or both written and oral communication (8.6%). Only 20% of the surveys reported not receiving any education about the HPV vaccine at their visits.

Discussion

The purpose of this project was to evaluate the effectiveness of an HPV education session on provider recommendations to eligible patients. The data from the study did not show any significant differences in provider recommendation practices when it came to the approach of the vaccine recommendation, those being a presumptive approach or participatory approach. Data did however show that providers did feel more comfortable providing education to parents about the HPV vaccine post-intervention (Table 1). Secondary data that was collected to evaluate the effectiveness of the intervention on overall HPV vaccine rates did show significant improvement in the pediatric clinics when comparing 2019 to 2020 rates for January through March at the 5% level whereas no statistical significance was seen for the family medicine clinics. This could potentially be due to the smaller sample size that was seen in the family medicine clinic as well as the wider age range of patients that may be seen in family medicine that may not always need a vaccine recommended to them. An increase was also seen in the monthly 2020 rates for January through March in the pediatric clinics (Table 2).

Parental survey data that was collected showed validity in the recommendation practices that the healthcare providers reported (Table 3). This included the healthcare providers almost always recommending the vaccine and provider education being a strong attribute of the overall recommendation practices. No statistical significance was seen when analyzing demographic

characteristics of the patient in relation to the receipt of vaccine such as ethnicity, household income, and parental education and this is more than likely due to the small sample size. Furthermore, when analyzing if the gender of the child affected the receipt of vaccine, no statistical significance between genders was seen which is ultimately the goal for both females and males to be vaccinated. Overall the data shows preliminary evidence that implementation of an HPV vaccine educational session to healthcare providers on recommended vaccine practices can lead to increased overall HPV vaccine rates.

The main limitation of this project was the timeframe in which the project was completed. This project was only able to be completed for a total of 3 months due to the COVID-19 pandemic. During the pandemic, restrictions were placed on the types of patients seen in the clinic as well as the availability of providers in the clinic to collect data on which ultimately was the reason for a higher response rate on the provider post-survey. With a higher response rate for the post-survey, this affected the average responses that were compared before and after the intervention and could have affected the analysis of the overall effectiveness of provider recommendation practices. Two other limitations include the small, convenience sample as well as the confounding variable of time of year in the clinics.

Systems Implications

In times of crisis such as the COVID-19 pandemic that is currently happening in the United States, there is increased pressure on not only healthcare resources but also healthcare budgets as well. Healthcare systems in general rely on preventative measures such as vaccinations to contribute to the sustainability of the overall system as well as reducing resource utilization by preventing infections and certain disease complications. Vaccine-preventable diseases are at a historic low level mainly due to high vaccination rates in the United States.

However, this past success has masked the health dangers of these once prevalent communicable diseases and many parents are unaware of the dangers of not vaccinating, and these diseases re-occurring. This can make it difficult for healthcare systems to communicate the need for vaccinations with parents and young adolescents having little to no experience with a communicable disease (Ventola, 2016).

Specifically for the HPV vaccine which helps prevent certain cancers, healthcare systems are presented with a large opportunity to avoid lack of knowledge and the unknown dangers as mentioned with many other vaccine-preventable diseases. The more healthcare providers who are knowledgeable about vaccines and are recommending them to their patients the better the opportunity to keep healthy people outside of the healthcare system. This is why it is critical for an increased uptake of vaccine programs such as the one done in this quality improvement project, especially in times such as the current pandemic when government officials are looking for more efficient use of healthcare resources.

Policy Implications

When it comes to vaccines and healthcare policy, many states have laws in place that lay out specific vaccine requirements for children in public/private schools and daycares as well as for young adults entering colleges and universities. Unlike the other adolescent vaccines, tetanus and meningitis, that are required for school entry in all jurisdictions of the country, the HPV vaccine is only required in five jurisdictions. This is mainly due to concerns about the drug's cost, safety, and parental rights to refuse as well as funding issues if the vaccine was made mandatory for school entry (*HPV Vaccine: State Legislation and Regulation*, n.d.).

Indiana is one of the states that does not require the vaccine for school entry however, the House Enrolled Act No.1278 was passed into law on April 14th, 2017 to help address HPV

prevention. This legislation mandated that the state department develop a strategic plan to identify barriers to prevention, screening, and treatment for cervical cancer ultimately hoping to reduce morbidity and mortality from cervical cancer in Indiana. As far as primary prevention, the Indiana Cervical Cancer Strategic Plan, published in 2018 by the State Department of Health, set a goal of increasing the percentage of adolescents 13-17 years of age who are up to date on the HPV vaccine from 40.8% to 80% by 2026.

Quality improvement projects such as this one fall in line with the strategies set out in the Indiana Cervical Cancer Strategic Plan to help achieve this goal. Some of those strategies included offering HPV vaccine continuing education and encouraging healthcare professionals to routinely and strongly recommend the HPV vaccination as part of the adolescent vaccines. I hope that my quality improvement project could continue to grow and develop into something that many healthcare professionals in Indiana could participate in and ultimately could contribute to the state of Indiana reaching their goal of 80% of adolescents receiving the HPV vaccination by 2026. It is also critical that other states in the United States consider passing similar legislation to help improve education, awareness, and overall access to the HPV vaccine for all adolescents.

Economics Implications

As with all vaccines that are given in the United States, the overall goal is to achieve immunity against and prevent infection or disease. For the HPV vaccine, it is not only the prevention of the virus but also cancer prevention as well. When assessing the economic burden that cancer can cause in a patient's life compared to a vaccine that could ultimately prevent cancer, the cost-effectiveness or the price paid for gains in life expectancy and quality of life is comparable to other preventative measures and generally acceptable. Cost-effectiveness of the

HPV vaccine can be difficult to assess as there are many key drivers such as duration of vaccine protection, vaccine price, coverage, and discounting rate that must be considered (Ng, Hutubessy & Chaiyakunapruk, 2018).

This being said, over the ten years that the HPV vaccine has evolved, “numerous modeling studies have indicated that routine HPV vaccination is an efficient use of public resources and can yield substantial reductions in HPV-associated disease over time (Markowitz, Gee, Chesson & Stokley, 2018).” The quadrivalent vaccine (4vHPV) as well as the bivalent vaccine (2vHPV) manufactured for administration to females showed between \$5,000 to \$30,000 cost per QALY gained, this is compared to with no vaccination. When the 4vHPV vaccine became licensed for males aged 9-26 years of age, models showed between \$25,000 to \$45,000 cost per QALY gained, this compared to female-only vaccination. When comparing cost per QALY gained for the current 9-valent HPV vaccine (9vHPV), that targets the same types as the quadrivalent vaccine as well as 5 additional cancer-causing types, to the 4vHPV vaccine, no change can be seen but overall cost savings has been proven (Markowitz, Gee, Chesson & Stokley, 2018). Overall, as the HPV vaccine evolves to target more and different strains of the human papillomavirus, a positive correlation can be seen when evaluating the overall cost-effectiveness of receiving the HPV vaccine compared to not receiving it.

Practice Implications

Healthcare providers are at the front line of a variety of prevention efforts including vaccinations for all ages. More specifically for the pediatric population, most vaccinations prevent infectious diseases and for the HPV vaccine reduces the risk of children getting genital warts and a variety of cancers. For these reasons and many more, it is so important that healthcare providers continue to implement successful vaccine recommendations in their

practice. The research done up to this point by many healthcare organizations recommends a specific way for providers to recommend the HPV vaccine that will ultimately increase the overall HPV vaccine rates. The data from this project showed that just providing education to healthcare providers on HPV vaccine recommendation practices could have a large impact on the overall vaccine rates in healthcare clinics.

With this being known, it is imperative even more now that healthcare providers continue to receive education on the importance of vaccines and how patients and their families best perceive this information allowing them to make the most educated decision on vaccinations. The recent COVID-19 pandemic has caused a large decrease in not only the HPV vaccine but all vaccines that are routinely given to children. According to the New York Times (2020), a pediatric health records company found that the HPV vaccine dropped 73% from February 16 to April 5 in 1,000 pediatric clinics across the country. The company also found that the measles, mumps, rubella shots dropped by 50% , and diphtheria and whooping cough vaccines dropped by at least 42%. This is mainly because parents are canceling their children's well visits however, healthcare providers must continue to educate parents on the importance of vaccinations. Educational sessions for healthcare providers such as the one done in this quality improvement project can be a great reminder to healthcare providers of the current issue at hand as well as recommended strategies for getting patients and their families to make educated decisions on vaccinating. Pediatric healthcare practices may also need to re-evaluate vaccine resources that are available to patients and families and consider alternative routes of education through things such as local media, social media, and also virtual visits.

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Tables

Table 1.

Provider HPV Survey Questions and Response Averages

Survey Question	Responses n (Average Likert Scale Response 1-10)	
	Pre-Survey	Post-Survey
Do you currently recommend the HPV vaccine to all eligible patients?	17 (9.5)	22 (9.2)
Do you currently use presumptive statements when recommending the HPV vaccine?	16 (8.2)	22 (7.6)
Do you currently use a bundled approach by recommending the HPV vaccine in the same way and on the same day that you recommend the other adolescent vaccines?	16 (8.4)	21 (7.8)
Do you currently use participatory statements when recommending the HPV vaccine?	15 (4.2)	19 (5.4)
How comfortable do you feel answering questions that patients and parents may have about the HPV vaccine?	17 (9.1)	20 (9.3)

Responses are based off a Likert Scale 1-10 with 1= Never, 5= Sometimes, 10= Always

Table 2.

Overall Clinic HPV Vaccine Rates

	Family Medicine HPV Rates n (% children with one or more HPV vaccine)		P-Value	Pediatric HPV Rates n (% children with one or more HPV vaccine)		P-Value
	2019	2020		2019	2020	
January	2 out of 85 (2.4%)	10 out of 91 (11%)	---	77 out of 1080 (7.1%)	178 out of 1278 (13.9%)	0.000
February	1 out of 75 (1.3%)	6 out of 85 (7.1%)	0.077	98 out of 1142 (8.6%)	162 out of 1117 (14.5%)	0.000
March	6 out of 90 (6.7%)	5 out of 80 (6.3%)	0.912	69 out of 1152 (6%)	90 out of 770 (11.7%)	0.002
Yearly	8.5%			7.9%		

Table 3.

Parental HPV Survey Results

Survey Question	Responses n (%)
Did your child receive the HPV vaccine today?	Yes: 25 (71.4%) No: 10 (28.6%)
Did you receive a recommendation from the healthcare provider for the HPV vaccine today?	Yes: 29 (82.9%) No: 5 (14.3%) Other: 1 (2/9%)
Did the provider educate you or your child on the HPV vaccine and if so how?	Oral: 21 (60%) Written: 3 (8.6%) None Given: 7 (20%) Other: 1 (2.9%) Oral/Written 3 (88.6%)
Has your child ever received the HPV vaccine before?	Yes: 11(31.4%) No: 24 (68.6%)