



RESEARCH ARTICLE

Human Papillomavirus Vaccine Education for Medical Assistants as a Strategy to Improve Vaccination Rates in 9-year-old Children

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ABSTRACT

Background: The Human Papillomavirus vaccine protects patients against Human Papillomavirus-related infection and cancers, yet it is underutilized. The American Academy of Pediatrics and the American Cancer Society now recommend starting the vaccine series at age 9 years. Medical Assistants can play a pivotal role in identifying and facilitating Human Papillomavirus vaccination in 9-year-old children and are the focus of this project.

Aim Statement: This project aims to examine whether one educational session can improve the perceptions, knowledge, and comfort level of Medical Assistants regarding Human Papillomavirus vaccination, thus promoting the vaccination in the pediatric clinic setting, especially with 9-year-old patients.

Methods: The project took place at three separate clinics of one pediatric organization in Utah.

Interventions: A 10–15-minute educational session about the Human Papillomavirus vaccine was presented to the Medical Assistants at each clinic, and a pre- and post-survey method was used to analyze the effect of the education on perceptions, knowledge, and comfort level in vaccinating 9-year-old children.

Results: Post-education data showed improvements in Medical Assistants' perceptions, knowledge, and comfort levels regarding the Human Papillomavirus vaccine. Comfort level of initiating the vaccine series at age 9 increased from 75% pre-survey to 100% post-survey. Pre-survey, 62.5% of Medical Assistants believed the Human Papillomavirus vaccine was effective; post-survey 100% of Medical Assistants believed the Human Papillomavirus vaccine was effective. When comparing pre- and post-survey results, respectively, 75% of Medical Assistants believed the Human Papillomavirus vaccine was safe compared to 100%.

Conclusions: An educational intervention on Human Papillomavirus vaccine improves perceptions, increases knowledge, and boosts comfort levels for Medical Assistants recommending the vaccine in the pediatric clinic setting.

Introduction

Vaccines save millions of lives annually by protecting individuals against more than 20 preventable diseases¹. Along with saving lives, vaccines also decrease the occurrence of long-lasting and potentially devastating effects associated with vaccine-preventable diseases². Vaccines also protect individuals and families from illnesses requiring isolation or quarantine, thus minimizing absenteeism and protecting the employees' source of income³.

The first human papillomavirus (HPV) vaccine received approval from the Food and Drug Administration for use in 2006⁴. After almost two decades of data, the vaccine is considered highly effective in decreasing the prevalence of HPV infections and, consequently, HPV-associated cancers⁵. Since the introduction of the HPV vaccine, there has been an 88% reduction in HPV infections among adolescent girls and an 81% reduction in HPV infections among young adult women⁶.

As of 2025, the Centers for Disease Control and Prevention routinely recommends initiating the HPV series at age 11-12 years, although the HPV vaccine can be given as early as age 9 years⁷. However, the American Academy of Pediatrics, the National HPV Vaccination Roundtable, and the American Cancer Society (ACS) now recommend routine vaccination with HPV starting at age 9 years⁸. However, only 21% of primary care providers routinely recommend HPV vaccine as early as age 9 years⁹. Most (59%) of primary care providers do not recommend HPV vaccination until the child is at least 11-years-old⁹.

Since the HPV vaccine is safe and effective, it is essential for all healthcare team members, including medical assistants (MAs), to promote HPV vaccination. Medical Assistant responsibilities include providing information about and administering medications, such as vaccinations, to patients under the direction of other healthcare providers (HCPs)¹⁰. Because MAs may be among the first to discuss vaccinations with patients, they must be well-educated and prepared to answer vaccine-related questions. However, vaccine-

related patient education training is not included in the core curriculum for MAs¹¹. Hence, MAs may require additional training to build knowledge and confidence in recommending vaccines to patients¹².

According to the President's Cancer Panel¹³, reducing missed opportunities for HPV vaccination and providing HPV vaccine education are two essential strategies to increase HPV vaccination rates. When properly trained, MAs can improve vaccination rates by identifying eligible patients and providing vaccine education for parents, thus preventing missed opportunities¹⁴. Therefore, this project aims to provide HPV vaccine education to MAs to influence perceptions, increase knowledge, and boost comfort levels when recommending HPV vaccines to parents, especially in the 9-year-old patient population.

PROBLEM DESCRIPTION

In 2020, the Office of Disease Prevention and Health Promotion¹⁵ published a new Healthy People 2030 goal to increase HPV vaccination rates from 48% to 80%. However, in the last 3 years, HPV vaccination rates have only increased by about 10%¹⁶. While there is progress toward reaching the 80% HPV vaccination goal by 2030, achieving the goal may require additional evidence-based programs that are replicable and sustainable¹⁷.

Reasons vaccine-hesitant parents refuse or delay HPV vaccination should be considered. According to the National Immunization Survey-Teen in 2019, these concerns include 1) uncertainty regarding the safety of HPV vaccination; 2) lack of knowledge about the vaccine/belief that the vaccine is unnecessary; and 3) lack of HCP recommendation¹⁸.

One prominent concern of HPV vaccine-hesitant parents is whether or not the HPV vaccination is safe. Sonawane et al.¹⁹ studied almost 40,000 unvaccinated adolescents and found that parents were commonly concerned about the safety of the HPV vaccine. Among the 40,000 unvaccinated adolescents, the number of safety concerns nearly doubled from 13% in 2015 to 23.4% in 2018. However, Beavis et al.²⁰ reported a slight decrease in HPV

safety concerns among parents with adolescent daughters, from 23% in 2010 to 22% in 2016. Human Papillomavirus vaccine-hesitant parents reported various safety concerns, ranging from mild side effects, such as discomfort, to chronic conditions, such as infertility, and death²¹. Other concerns many HPV vaccine-hesitant parents share are a knowledge deficit about the HPV vaccine or the belief that it is unnecessary¹⁸. Kepka et al.²² performed a study in diverse Utah populations and confirmed a correlation between knowledge about HPV infection, HPV vaccine, and receiving the vaccine. Less than half of the study participants knew that HPV infection caused cervical cancer, and only approximately 30% knew that most of the population would be infected with HPV at some point in their lives. This lack of knowledge may lead parents to discount the importance of the HPV vaccine. Indeed, of 120,000 vaccine-hesitant parents, 20% stated that they felt the vaccine was unnecessary for their child²³.

The lack of a strong HCP recommendation negatively affects HPV vaccine acceptance rates^{18,23}. However, when HCPs strongly recommend the HPV vaccine, uptake is improved. For example, Lu et al.²⁴ discovered that young males whose HCP recommended the HPV vaccine were vaccinated 68.8% of the time. In comparison, young males who received no HPV vaccine recommendation were only vaccinated 35.4% of the time²⁴. Although a strong HCP recommendation is one important indicator of HPV vaccine acceptance, Kong et al.²⁵ reported vaccination recommendation disparities among different patient populations. Notably, male patients and those from lower-income households were less likely to receive a recommendation for the HPV vaccine from their HCP. Additionally, Lake et al.²⁶ found that HPV vaccine recommendations were also dependent upon patient age; only 65% of HCPs strongly recommended HPV vaccine for 9-10-year-old patients, while 94% of HCPs strongly recommended HPV vaccine for 11-12-year-olds.

AVAILABLE KNOWLEDGE/REVIEW OF LITERATURE
Educational interventions can help increase HPV vaccination acceptance rates. Rani et al.²⁷ found that

some educational interventions increased vaccine uptake better than others. The most successful interventions involved education provided by someone with HPV vaccine expertise, by a patient peer who recommended the vaccine, and directly to parents of the vaccine recipient²⁷. Vaccine education content regarding HPV vaccine efficacy, safety, and benefits was also correlated with positive changes in parents' perceptions²⁸. Additionally, parents who watched an educational video about HPV vaccine risks and benefits were three times more likely to vaccinate their child than those who did not²⁹.

Healthcare Provider recommendation of the HPV vaccine is an important step in increasing vaccination rates. A strong HCP recommendation helped one small clinic increase their HPV vaccination rates by 600% in 1 year³⁰. Another clinic focused on educating providers as one of their interventions to improve HPV vaccination rates. The education module included information about HPV infection, HPV vaccination, and strategies to deliver a strong recommendation. With only one HCP training, HPV vaccination rates improved from 17.8% to 63.6% in 1 year. Additionally, in the same study, 80% of the surveyed parents reported that their child received the HPV vaccine as a direct result of the HCP's strong recommendation³¹.

Receiving the initial HPV vaccination at 9 years old is a safe and effective way to improve HPV vaccination rates. If vaccinated before 15 years of age, patients require two doses of the HPV vaccine, while patients aged 15 years and older require three vaccinations to complete the series³². Regarding immunogenicity, Lazcano-Ponce et al.³³ discovered that the 2-dose series was not inferior to the 3-dose series. Thus, starting the 2-dose HPV vaccine series at age 9 years allows patients to be fully vaccinated efficiently without compromising the efficacy of the immune response. Additionally, when comparing HPV vaccine completion rates, those who initiated the vaccine series before age 11 years were more likely to be up-to-date (93%) than their counterparts who began the vaccine series after age 11 years (72%)³⁴.

RATIONALE

Conceptual/Theoretical Framework

Vaccine hesitancy is more pervasive than ever, especially since the COVID-19 pandemic³⁵; however, the theoretical underpinnings for vaccine hesitancy are ambiguous³⁶. Vaccine hesitancy, in and of itself, is not a theoretical framework. Instead, vaccine hesitancy is more about having a framework for making decisions rooted in people's commitment to healthism/risk culture theory³⁶. Healthism represents a lens through which a person views a particular health problem. Typically, healthism is embraced by health-conscious people who believe good health is a moral issue and that health is solely the responsibility of the individual³⁷. According to risk culture theory, also known as Culture Theory, individuals utilize patterns of social relations to develop cultural biases and, consequently, to determine which hazards pose high risk versus low risk³⁸.

The healthism/risk culture theory embodies risk assessment, which is influenced by morality and the driving need to make personal vaccine decisions. Recognizing that healthism/risk culture theory may, in addition to parents and patients, also lead to vaccine hesitancy among healthcare professionals provides valuable insight when creating an HPV education module designed explicitly for MAs. An effective HPV education module should, ideally, address the fact that HPV vaccination protects the health of individuals³⁹.

Reasons or Assumptions Used to Develop Interventions

After reviewing the available literature on common HPV vaccine barriers and identifying topics for MA educational interventions, a few assumptions were made regarding this project.

- 1) An education module could be created to train MAs on the importance of the HPV vaccine.
- 2) Because MAs often track and administer vaccines in the clinical setting, training them to identify eligible patients for HPV vaccine,

especially at the 9-year-old age, would help improve timely HPV vaccination in the clinic.

- 3) As the first medically trained contact a parent and patient may encounter, MAs should be equipped to answer common questions regarding HPV vaccination and successfully dispel incorrect beliefs.
- 4) Medical Assistants have the ability to improve HPV vaccination rates in a clinical setting.

SPECIFIC AIMS

Three specific questions guide this quality improvement pilot project:

- 1) What effect does a 10-15 minute HPV education module have on MAs' perceptions of the HPV vaccine?
- 2) What effect does a 10-15 minute HPV education module have on MAs' knowledge of the HPV vaccine?
- 3) What effect does a 10-15 minute HPV education module have on MAs' comfort level in recommending the HPV vaccine to 9-year-old patients and their parents?

Methods

CONTEXT

This pilot project aimed to evaluate the perceptions, knowledge, and comfort level of MAs employed by a pediatric practice with three locations in Salt Lake County, Utah, regarding the HPV vaccine. One of the NPs in the practice spoke with the ACS about their recommendation to initiate the HPV vaccine series at age 9 years. After consulting with clinic administration, the NP decided to try to update the protocol regarding HPV vaccination to comply with the latest ACS recommendation. The NP contacted vaccine experts at a local university to assist in launching the initiative.

INTERVENTION(S)

Medical Assistants attended an in-person vaccine education at one of three clinic locations. The education was created with vaccine experts, healthcare

providers, researchers, and clinic leadership. The education presentation underwent several iterations, returning to the stakeholders for recommendations. The final product utilized a PowerPoint modality. The effect of the education was measured with a pre- and post-education questionnaire.

All potential participants were sent a text message with a reminder about the vaccine education and lunch at the beginning of the week. Lunch was provided for participants to compensate for their time. Prior to the HPV vaccine education, participants were provided with a QR code to access the pre-education survey. A 10-15 minute in-person HPV vaccine education training occurred with MAs. The vaccine education encompassed the prevalence of HPV infection and the efficacy and safety of the HPV vaccine. The vaccine education included background on and consequences of HPV infection and efficacy, safety, and eligibility regarding the HPV vaccine. Data were provided on the practice's current HPV vaccine status and goals for improvement. Potential barriers to operationalizing a new workflow focusing on administering HPV vaccines to 9-year-old children were also addressed. After the education, participants were presented with another QR code to access the post-education survey. This process was replicated at each clinical site.

STUDY OF THE INTERVENTION(S)

A pre- and post-education questionnaire was distributed to all MA participants to evaluate the effect of the education.

MEASURES

The pre- and post-education questionnaires were created by a graduate student and three professors with expertise in vaccine education, in collaboration with an FNP and the MA Director. Participants were asked three questions about their perceptions of the vaccine, six questions about their knowledge of the vaccine, and three questions about their comfort in recommending the HPV vaccine.

ANALYSIS

Participant responses were exported from Qualtrics into an Excel document. Two researchers confirmed

the accuracy of each response. Frequencies and percentages were calculated for all items.

ETHICAL CONSIDERATIONS

The project was reviewed by the University IRB and deemed to be exempt.

Results

Eight MAs completed the pre- and post-education questionnaires and participated in the educational presentation. Demographic data were not collected, except for names which were utilized for the sole purpose of matching the pre- and post-questionnaire responses. Medical Assistants' perceptions of HPV vaccine safety, efficacy, and optimal age at vaccine initiation improved from pre-education to post-education (Table 1). Knowledge regarding the HPV vaccine also improved when evaluated pre- and post-education, specifically the timing and purpose of the vaccination and how the vaccine relates to concerns regarding sexual activity and infertility (Table 2). Medical Assistants were also questioned about their comfort level (0 being extremely uncomfortable and 10 being extremely comfortable) when recommending the HPV vaccine to patients based on 9-10, 11-12, and 13+ age groups (Table 3). The average scores for each age group improved after receiving the HPV vaccine education, although the most notable difference was in the 9-10-year-old age group with an average pre-education score of 7 (SD 2.51) and an average post-education score of 8.5 (SD 1.93).

Table 1: MAs' perceptions regarding HPV vaccine

	Pre-education	% (n)	Post-education	% (n)
Is the HPV vaccine safe?	Definitely yes	75% (6)	Definitely yes	100% (8)
	Probably yes	25% (2)	Probably yes	0
	Might or might not	0	Might or might not	0
	Probably not	0	Probably not	0
	Definitely not	0	Definitely not	0
Is the HPV vaccine effective?	Definitely yes	62.5% (5)	Definitely yes	100% (8)
	Probably yes	37.5% (3)	Probably yes	0
	Might or might not	0	Might or might not	0
	Probably not	0	Probably not	0
	Definitely not	0	Definitely not	0
At what age <i>do you think</i> patients should get the first HPV vaccine?	9	75% (6)	9	100% (8)
	10	12.5% (1)	10	0
	11	0	11	0
	12	0	12	0
	13	0	13	0
	14	0	14	0
	15+	12.5% (1)	15+	0
	I don't think patients should get the HPV vaccine	0	I don't think patients should get the HPV vaccine	0

Table 2: MAs' knowledge regarding HPV vaccine

	Pre-education	% (n)	Post-education	% (n)
What is the earliest age a pediatric patient can get their first HPV vaccination?	9	87.5% (7)	9	100% (8)
	10	12.5% (1)	10	0
	11	0	11	0
	12	0	12	0
	13	0	13	0
	14	0	14	0
	15+	0	15+	0
Should pediatric patients wait to receive the HPV vaccination until they are sexually active?	Yes	12.5% (1)	Yes	0
	No	87.5% (7)	No	100% (8)
	I don't know	0	I don't know	0
Is there a chance that the HPV vaccine can cause infertility?	Yes	0	Yes	12.5% (1)
	No	62.5% (5)	No	87.5% (7)
	I don't know	37.5% (3)	I don't know	

Table 3: MAs' comfort level in recommending the HPV vaccine

	Pre-education	% (n)	Post-education	% (n)
How comfortable are you with recommending the HPV vaccine when the patient is 9-10 years old? (0 is extremely uncomfortable and 10 is extremely comfortable)	0	0	0	0
	1	0	1	0
	2	0	2	0
	3	12.5% (1)	3	0
	4	12.5% (1)	4	0
	5	0	5	12.5% (1)
	6	12.5% (1)	6	0
	7	12.5% (1)	7	25% (2)
	8	12.5% (1)	8	0
	9	25% (2)	9	12.5% (1)
	10	12.5% (1)	10	50% (4)
	Average	7 (SD 2.51)	Average	8.5 (SD 1.93)
How comfortable are you with recommending the HPV vaccine when the patient is 11-12 years old? (0 is extremely uncomfortable and 10 is extremely comfortable)	0	0	0	0
	1	0	1	0
	2	0	2	0
	3	12.5% (n = 1)	3	0
	4	0	4	0
	5	0	5	12.5% (n = 1)
	6	12.5% (n = 1)	6	0
	7	0	7	0
	8	12.5% (n = 1)	8	12.5% (n = 1)
	9	25% (n = 2)	9	12.5% (n = 1)
	10	37.5% (n = 3)	10	62.5% (n = 5)
	Average	8.1 (SD 2.47)	Average	9 (SD 1.77)
How comfortable are you with recommending the HPV vaccine when the patient is 13+ years old? (0 is extremely uncomfortable and 10 is extremely comfortable)	0	0	0	0
	1	0	1	0
	2	0	2	0
	3	12.5% (n = 1)	3	0
	4	0	4	0
	5	0	5	12.5% (n = 1)
	6	0	6	0
	7	0	7	0
	8	25% (n = 2)	8	12.5% (n = 1)
	9	25% (n = 2)	9	12.5% (n = 1)
	10	37.5% (n = 3)	10	62.5% (n = 5)
	Average	8.4 (SD 2.33)	Average	9 SD (1.77)

Discussion

In this project, a single educational session of 10-15 minutes improved MAs' scores, quantifying their HPV vaccine perceptions and knowledge. The MAs' comfort level also improved across all patient age groups (9-10, 11-12, and 13+). One specific strength of this project is that it specifically studied MAs instead of solely focusing on HCPs, providing unique insights into a vital healthcare team member who is heavily involved in vaccination administration.

Educating MAs on the HPV vaccine may ultimately and positively influence vaccine uptake. Parents who question the HPV vaccine may ask MAs for information since the MA is often the first point of contact in the clinic setting. There is a lack of HPV vaccine confidence among some healthcare professionals⁴⁰; thus, education that improves the perceptions of HPV vaccine safety and efficacy may positively influence the strength of the HPV vaccination recommendation⁴¹. In this project, the MAs' perceptions regarding HPV vaccine safety and efficacy improved after receiving only one 10-15-minute HPV vaccine education presentation.

Despite evidence proving the safety of the HPV vaccine⁴⁰, the misconception that the HPV vaccine causes infertility remains^{21,43}. Due to insufficient research on this specific misconception, it is unknown if it can be effectively disproved through education alone. In this project, the majority of MAs understood post-education that the HPV vaccine does not cause infertility. There was, however, one post-education participant who still reported infertility as a potential side effect of the HPV vaccine. Due to the small sample size, however, it is unclear if this finding indicates that infertility is a stubborn misconception or if the participant misunderstood the question.

After the educational intervention, the greatest increase in comfort levels was seen in the 9–10-year-old age group, with an increase of 1.5 points (out of 10). Although the increase in vaccine comfort level is noteworthy, a few MAs were still less comfortable than one may expect after receiving HPV vaccine

education. Interestingly, similar results were seen in a pre- and post-education study among medical students. After receiving HPV vaccine education, the medical students were asked if the HPV vaccine caused more benefits than harm. Again, a few medical students were not convinced that the HPV vaccine's benefits outweighed the risk of harm⁴⁴. Given that the MAs and the medical students had one educational session, all participants' confidence in HPV vaccine benefits could be improved with a series of HPV vaccine education sessions.

The results of this project show that MAs employed at the pediatric clinics in Salt Lake County, Utah, already had a foundational understanding of the HPV vaccine before receiving the HPV vaccine education. These findings, however, are unusual when compared to the literature. For example, vaccine acceptance and support seem to be related to the healthcare workers' years of education. Thus, physicians are typically the strongest proponents of vaccines⁴⁵. Still, this project showed that MAs' perceptions, knowledge, and comfort levels regarding the HPV vaccine can be improved with only one educational session.

LIMITATIONS

Like all projects, there are limitations. In this project, only one pediatric group with three locations was included. Therefore, the success of this project may not be generalizable to other MAs working with pediatric populations. Furthermore, while all eight of the MAs participated in the education, the sample size was very small. However, the project could easily be replicated in other pediatric groups with a larger sample. The training and pre- and post-education questionnaires were created by a group of vaccination experts and HCPs to evaluate perceptions, knowledge, and comfort level of HPV vaccine for a specific group of MAs, but the training and the pre- and post-questionnaires could be easily adapted to fit the needs and goals of any pediatric practice. Additionally, only one training was held, so it is unknown whether the MAs' perceptions, knowledge, and comfort levels regarding HPV vaccine would continue to improve with a series of trainings.

Conclusion

While the safety of the HPV vaccine is well established, it is still underutilized in the pediatric population, especially among 9-10-year-olds. Medical Assistants can play an essential role in improving HPV vaccine uptake and were, therefore, included in this project to determine whether one educational session could positively influence their perceptions, knowledge, and comfort levels. While the one educational session did not completely improve the comfort level of all the MAs, there was still considerable improvement. These findings are important to the medical community as they show that a relatively inexpensive and straightforward intervention can result in positive changes for MAs. In turn, MAs may be more likely to help increase HPV vaccination rates for pediatric patients.

Recommendations for future projects include incorporating a multi-pronged approach to increase HPV vaccination rates among 9-year-olds such as, including an HPV vaccine eligibility alert in the electronic health record, education for all members of the healthcare team in the clinic setting, and an in-clinic champion who consistently promotes the intervention over a specific amount of time, such as a year. Another recommendation is to deliver a series of educational seminars throughout the year to reinforce HPV education. A final recommendation is to increase the sample size or expand the intervention to include other clinics to verify reproducibility.

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