

HUMAN PAPILLOMAVIRUS HEALTH LITERACY AND VACCINATION
RECOMMENDATION PRACTICES AMONG NORTH CAROLINA PHYSICIANS

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Abstract

The purpose of this research is to assess the HPV-related knowledge and vaccination recommendation practices of North Carolina physicians. A 25-question online survey was distributed to the NC Pediatric Society Listserv, the NC Family Medicine July and August 2018 e-newsletter and emailed to all pediatric and family medicine physicians who are registered with the NC Medical Board. Survey items included questions about HPV-related epidemiology, practice vaccination policy, and recommendation guideline adherence. The results of the survey highlighted key areas of strength, such as comfort discussing sexually transmitted infections (STIs) and areas of improvement, such as HPV knowledge, dosing schedule, and policy. Almost all physicians (94%) reported being comfortable discussing STIs and recommending the HPV vaccine for patients (98%). However, only half (50%) of physicians knew that most HPV infections clear up within 2 years, and that HPV-related oropharyngeal cancer is highest among men (51%). Almost two-thirds of physicians (64%) did not know the correct HPV vaccine dosing schedule for an 11-12-year-old. Over half of practices (58%) did not have an HPV vaccination policy. Roughly half (51%) of participants were interested in a brief training on the newest HPV vaccine guidelines, with over half (55%) of respondents favoring an online training for continuing education credit. Notably, only 27% of physicians were using the Advisory Committee on Immunization Practices (ACIP) preferred recommendation method of informing the parent that their child is due for the HPV vaccine, providing information, and ordering the vaccine unless the parent objects. These results show the need for improvement in HPV knowledge, adherence to recommendation guidelines, and a need for practice vaccination policy among NC physicians.

Background

The Human Papillomavirus (HPV) is the most common sexually transmitted infection (STI) in the United States (National Institute of Health [NIH], 2018). Nearly 80 million people are currently infected, and about 14 million people, including adolescents, become infected with HPV each year in the US (Centers for Disease Control and Prevention [CDC], 2016). HPV can cause genital warts and certain types of cancers including cancer of the cervix, vulva, vagina, penis, anus, rectum, and oropharynx in both men and women if left untreated (CDC, 2016).

There have been three FDA approved vaccines used to protect against HPV infection and related morbidities, which include Gardasil, Cervarix, and Gardasil 9 (NIH, 2016). Gardasil and Cervarix protect against strains 16 and 18, and the newest currently used vaccine Gardasil 9 prevents cancers from HPV types 16, 18, 31, 33, 45, 52, and 58 (NIH, 2016). The United States Advisory Committee on Immunization Practices (ACIP) recommends vaccination for all girls and boys starting at 11 or 12 years of age, with catch up vaccinations between ages 13–26 in women and 13–21 in men (NIH, 2016). In October 2016, the FDA approved a 2-dose schedule for boys and girls with Gardasil 9 at ages 9 to 14 years, with a second dose is to be administered 6–12 months later (NIH, 2016). Those initiating the HPV vaccination at 15 years old and older should be vaccinated according to a 3-dose schedule (NIH, 2016).

Every year in the United States, HPV causes 33,700 cancers in men and women; however, HPV vaccination can prevent around 93% of these cancers from ever developing (CDC, 2016). Studies have shown that a health care provider's recommendation is one of the strongest and most consistent predictors of HPV vaccination uptake, yet providers often miss opportunities to deliver effective recommendations due to lack of knowledge, intention, or even discomfort discussing STIs with adolescents and parents (Ylitalo, Lee, & Mehta, 2013).

According to a 2016 Morbidity and Mortality Weekly Report, as of 2015, only 42% of girls and 28% of boys, ages 13–17, had completed the HPV vaccine series (Reagan-Steiner, et al., 2015). This report demonstrates the lack of awareness and physician recommendation surrounding the HPV vaccination. This is important because for every additional year of low coverage, another 4,400 girls will develop cervical cancer over the course of their lifetimes (Chesson, Ekwueme, Saraiya, Dunne, & Markowitz, 2014).

Studies have shown that healthcare providers are not in compliance with ACIP and American Academy of Family Physicians (AAFP) vaccination recommendation guidelines and are not consistently recommending the HPV vaccine (Gilkey, et al., 2016). It is recommended that physicians bundle the HPV with other recommended pre-teen vaccines, specifically TDAP and Meningococcal (American Academy of Family Physicians [AAFP], 2014). The bundling approach has been shown to normalize and increase acceptance of the HPV vaccine while demonstrating its importance (AAFP, 2014). The ACIP preferred recommendation communication method of informing the parent that their child is due for the HPV vaccine, providing information about the vaccine, and ordering the vaccine during the current visit unless the parent objects promotes effective HPV vaccine initiation and completion while discouraging vaccine refusal and delay.

This lack of effective provider guideline compliance could be related to their personal understanding of HPV epidemiology and vaccination policy. Therefore, it is important to understand the factors that can affect providers' HPV vaccination practices. Potential factors that may impact recommendation practices of the HPV vaccine are the providers' HPV-related health knowledge, attitude towards vaccination, and vaccination policy.

The purpose of this study is to assess HPV vaccination recommendation practices and overall HPV-related knowledge of North Carolina physicians. Currently, there is a lack of information about HPV vaccination knowledge and recommendation practices of North Carolina physicians. This study is important because it is the first to determine state-level data on the topic of HPV health literacy and physician prevention practices in North Carolina health care providers. This information can be used to guide new continuing-education requirements and medical schools' curriculum to enhance HPV primary prevention practices in the future.

Methodology

The data for this research was collected via an online survey software program called Qualtrics. The population of interest was Pediatricians and Family Medicine practitioners in North Carolina. This study focused specifically on these two medical specialties because healthcare providers in these fields are most likely to have opportunities to recommend and administer HPV vaccinations to pre-teens and adolescents.

According to the NC Medical Board, there are currently 27,803 registered licensed and active physicians in North Carolina (North Carolina Medical Board [NCMB], n.d.). Of these, only 3,565 practice family medicine and 2,684 practice pediatrics (NCMB, n.d.).

A link to the 25-question online Qualtrics survey was distributed through the NC Pediatric Society Listerve to all physicians who met inclusion criteria. The link was also included in the July 2018 and August 2018 issues of the NC Family Medicine e-newsletter. Due to a low initial response rate, the survey link was also emailed to all pediatric and family medicine physicians in NC who have an email registered with the NC Medical Board. As an incentive, physicians who completed the survey were entered into a raffle drawing for an Apple Watch or Fitbit by entering their email address at the end of the survey.

The survey was developed using previously validated surveys used in similar populations and was piloted, and tested for readability, reliability, and validity among a panel of experts. The survey included questions about HPV-related knowledge, patient-provider communication, and self-efficacy in providing primary HPV prevention. Six main variables were measured in the survey: (1) HPV health literacy skills, (2) personal attitudes about HPV, (3) perceived social pressures and scope of practice, (4) perceived behavioral control, (5) intention to prevent through discussion, recommendation, and vaccination administration, and (6) HPV vaccination practices. Questions regarding basic demographics, including amount of years in practice and race, medical specialty, and practice type were also included in the survey. A statement of informed consent was at the beginning of the online survey and notified participants that their decision to complete the survey indicated informed consent.

The survey platform Qualtrics is a simple web-based survey tool used to conduct survey research, evaluations, and other data collection activities (Bosch, 2015). Qualtrics has the ability to export data directly to SPSS, CSV, PDF, Word, Excel, and PowerPoint for ease in statistical analysis (Bosch, 2015). Various methods of statistical analysis were used to analyze data including basic descriptive statistics on all variables, McNemar's Test, Simple Kappa Coefficient, Analysis Variable based on demographics, Equality of Variances, the FREQ procedure, the TTest procedure, the MEANS procedure, and Fisher's Exact Test.

Results

The effective sample size was 307. The sample was balanced in regard to physician gender, with 56% female physicians and 44% male physicians. Most respondents identified as White (80%), while 6% identified as Black, 5% Asian/Pacific Islander, 5% Latinx, and 4% other (Table 1).

Table 1. Race/ethnicity of study participants n=307

Race/Ethnicity	Frequency	%	Cumulative Frequency	Cumulative %
Asian / Pacific Islander	14	4.93	14	4.93
Black or African America	17	5.99	31	10.92
Hispanic or Latino	13	4.58	44	15.49
Native American or Ameri	1	0.35	45	15.85
Other	12	4.23	57	20.07
White	227	79.93	284	100.00

The age distribution was fairly equally distributed, with 35% of physicians 18-44 years old, 31% of physicians 45-54 years old, and 34% of physicians 55 years or older (Table 2).

Table 2. Age distribution of participants n=307

Age	Frequency	%	Cumulative Frequency	Cumulative %
18-44 years old	101	34.95	101	34.95
45-54 years old	90	31.14	191	66.09
55 years or older	98	33.91	289	100.00

Almost all physicians (94%) reported feeling comfortable or very comfortable talking with adolescents about sexually transmitted infections and recommending the HPV vaccine for patients (98%). However, only around a quarter (27%) of physicians reported using the Advisory Committee on Immunization Practices (ACIP) preferred recommendation method of informing the parent their child is due for the HPV vaccine, providing information about the vaccine, and ordering the vaccine unless the parent objects.

There were also very large knowledge gaps with only half (50%) of physicians knowing that most HPV infections clear up within 2 years, and that HPV-related oropharyngeal cancer is highest among men (51%). Although physicians should be recommending the HPV vaccine to all adolescents, 16% reported recommending the HPV vaccine more often for adolescents at a higher risk for getting HPV. Just under a quarter (24%) of physicians did not know that vaccination is recommended through age 26 for gay, bisexual, and men who have sex with men (MSM), and less than half (40%) of physicians did not know that the correct HPV vaccine dosing schedule for an 11-12-year-old was 6-12 months. Furthermore, over half of participant practices (58%) did not have an HPV vaccination policy.

There were also differences in recommendation practices by patient characteristics. For example, physicians reported to be more likely to routinely recommending HPV vaccination in female patients compared to male patients 9-12 years old. This difference in recommendation based upon patient gender was statistically significant ($p < 0.05$) (Table 3).

Table 3. Physician recommendation based on patient gender

Female Patient Recommendation	Male Patient Recommendation		
	No	Yes	Total
No	49	2	51
Yes	19	219	238
Total	68	221	289

Female physicians are more compliant in routinely recommending the HPV vaccine to both female patients and male patients aged 9-12 compared to male physicians. This was a statistically significant difference ($p < 0.05$) (Table 4 & 5). Female physicians (84%) were more likely to recommend the vaccination to female patients compared to male physicians (72%)

(Table 4). Female physicians (81%) were more likely to recommend the vaccination to male patients compared to male physicians (71%) (Table 5).

Table 4. Provider gender vs recommendation to female patient n=288

Provider Gender	Recommendation for Female Patient		
	No	Yes	Total
Female	26 16.25	134 83.75	160
Male	36 28.13	92 71.88	128
Total	62	226	288

Table 5. Provider gender vs recommendation to male patient n=275

Provider Gender	Recommendation for Male Patient		
	No	Yes	Total
Female	29 18.59	127 81.41	156
Male	35 29.41	84 70.59	119
Total	64	211	275

Older doctors with more years of experience are less compliant in recommending the HPV vaccination to male patients. Specifically, 82% of doctors with 10 years or less experience comply with guidelines as compared to only 73% of doctors with over 20 years' experience and 78% of doctors with 10-19 years of experience (Table 6).

Table 6. Years of experience vs compliance in recommending to male patients n=276

Years of Experience	Recommendation to Male Patients		
	No	Yes	Total
10-19 years	15 21.74	54 78.26	69
20+ years	34 26.98	92 73.02	126
<10 years	15 18.52	66 81.48	81
Total	64	212	276

Female physicians (32%) are more compliant with ACIP guidelines regarding communication styles with patients compared to male physicians (20%) ($p < 0.05$) (Table 7). The ACIP guidelines call for informing the parent their child is due for the HPV vaccine, providing information about the vaccine, and making the decision to order the HPV vaccine unless the parent objects.

Table 7. Physician gender vs ACIP communication guideline compliance n=262

Physician Gender	Guideline Compliance		
	No	Yes	Total
Female	101 67.79	48 32.21	149
Male	90 79.65	23 20.35	113
Total	191	71	262

Female physicians (85%) are more compliant with ACIP and AAFP guidelines in recommending the “bundle” in which adolescents get all their pre-teen vaccinations during the current visit. This was statistically significant ($p < 0.05$) (Table 8).

Table 8. Physician gender vs guideline “bundle” compliance n=262

Physician Gender	Guideline Compliance		
	0	1	Total
Female	23 15.44	126 84.56	149
Male	31 27.43	82 72.57	113
Total	54	208	262

Older physicians with over 20 years of experience (83%) are more likely to anticipate having an uncomfortable conversation while recommending the HPV vaccine to adolescents compared to younger physicians with less than 10 years of experience (74%) and physicians with 10-19 years of experience (67%). This was borderline significant ($p < 0.09$) (Table 9).

Table 9. Years of experience vs comfort level n=264

Years of Experience	Comfort Level		Total
	Comfortable	Uncomfortable	
10-19 years	22 33.33	44 66.67	66
20+ years	21 17.36	100 82.64	121
<10 years	20 25.97	57 74.03	77
Total	63	201	264

Female physicians (98%) are significantly more likely to report being comfortable in discussing STIs with adolescents compared to male physicians (89%). This was a statistically significant difference ($p < 0.05$) (Table 10).

Table 10. Physician gender vs comfort level n=263

Physician Gender	Comfort Level		
	Comfortable	Uncomfortable	Total
Female	146 97.99	3 2.01	149
Male	101 88.60	13 11.40	114
Total	247	16	263

Discussion

The results of this study highlighted key areas of improvement for North Carolina physicians, including gaps in HPV knowledge and vaccination dosing schedule, lack of vaccination policy at practice level, and lack in adherence to recommendation guidelines.

The results of the North Carolina statewide physician survey were consistent with previous studies on recommendation guideline compliance and practice. The lack of awareness and physician recommendation surrounding the HPV vaccination reported in previous studies and reports was also demonstrated in this study, with only a quarter (27%) of physicians reportedly following ACIP guidelines of vaccination recommendation. The lack of HPV-related knowledge surrounding basic epidemiology and routine vaccination dosing schedule was highlighted. The results of this study also showed a bias in HPV vaccination recommendation based upon patient gender and lifestyle risk factors.

While almost all physicians reported being comfortable recommending the HPV vaccine, only 27% of the sample size were in compliance with ACIP recommendation guidelines. This low compliance was commonly shown in older male physicians through age and gender statistical comparisons.

There was a major difference in recommendation between female and male physicians. Female physicians were significantly more likely to be compliant in routinely recommending HPV vaccination to female and male patients aged 9-12 compared to male physicians, are more likely to use the ACIP recommended communication style with parents/patients when recommending the HPV vaccination, and are more likely to recommend the HPV vaccination in a bundle with the other pre-teen vaccinations (TDAP and meningococcal) according to ACIP and AAFP guidelines. Additionally, female physicians were more comfortable discussing STIs with patients/parents than male physicians, which can heavily influence communication styles and giving an efficient recommendation.

Overall older physicians with more years of experience were less compliant with vaccination recommendation guidelines and are specifically less compliant in recommending the HPV vaccination to male patients. Older physicians with more years of experience are less comfortable when discussing STIs with patients/parents. This may impact their recommendation styles and could correlate with their low guideline adherence.

These results demonstrate a need for more HPV-related education and knowledge of the best recommendation practices and patient-provider communication techniques among NC physicians, especially among older male physicians.

The primary strengths of this study include convenience and ease of response to the online survey questions. Since it was an anonymous survey, respondents may have been more honest and willing to share personal information.

A limitation of this study is the response rate and small effective sample size relative to the number active and licensed family medicine and pediatric physicians in North Carolina. This means that the results of this study may not represent the perceptions and practices of all NC

physicians. Because the survey was distributed online, there may be a nonresponse bias. The physicians who did not respond may have different practices than those physicians who responded to the survey.

Conclusion

Research shows that up to 80% of people in the United States, both women and men, will at some point contract HPV, yet the HPV vaccine could prevent over 90% of HPV-related cancers from ever occurring (CDC, 2016). The HPV vaccine is critical for widespread prevention. Provider recommendation highly encourages patients to obtain the vaccine and understanding the factors that surround physician recommendation is important in increasing successful uptake.

Only a quarter (27%) of North Carolina physicians in the sample followed ACIP guidelines on recommendation communication and practice. This demonstrates a need for better statewide policy regarding HPV health literacy and vaccination. Older male physicians were least likely to follow guidelines and least likely to feel comfortable discussing STIs with adolescents. Physicians should understand HPV-related education and updated guidelines in order to provide the best primary prevention for patients. If physicians are confident in their own knowledge level and understanding, then they will likely be more comfortable discussing HPV with patients/parents and recommending the vaccine. By strongly endorsing HPV vaccine and recommending same day vaccination bundled with other preteen vaccines, providers may be able to promote effective HPV vaccine initiation and completion while discouraging vaccine refusal and delay.

The next step in this research is to develop and incorporate an HPV-related enhanced training curriculum for medical students and continuing education training for current practicing

physicians. Future research should seek to build on the present study by identifying other factors that influence provider-patient communication practices that support HPV vaccination and areas of improvement in physicians HPV-related health literacy.

This study and corresponding results were presented at ECU Research and Creative Achievement Week (4/3/19) and at the ECU Department of Health and Human Performance National Public Health Week poster symposium (4/4/19).

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