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Primary care physicians' adherence to expert recommendations for cervical cancer screening and prevention in the context of human papillomavirus vaccination

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Abstract

Background—Expert recommendations do not recommend using Pap or human papillomavirus (HPV) test results to determine whether unvaccinated females should receive HPV vaccine, nor do they recommend using vaccine receipt to inform cervical cancer screening practices. This study characterizes physicians' HPV vaccine recommendations and practices in the context of HPV and Pap testing.

Methods—We surveyed family physicians and obstetrician-gynecologists randomly selected from the American Medical Association Masterfile in 2011 (n = 574). Physicians used a 5-point scale (never to always) to report the frequency of (1) using HPV testing results to decide whether to recommend HPV vaccine, and (2) recommending HPV vaccination to females (≤26 years) who had an abnormal Pap test. Physicians also reported (3) intention to change Pap screening frequency for vaccinated females.

Results—Across both specialties, 80% correctly reported rarely or never using HPV testing results to guide vaccine recommendations; 66% often or always recommended vaccination to patients with an abnormal Pap result; and 77% did not plan to change Pap screening frequency for vaccinated females. About 41% reported recommendation-consistent practices with all three

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measures. In multivariable analysis, obstetrician-gynecologist specialty and private practice type were associated with higher average overall adherence to recommendations.

Conclusions—Contrary to expert recommendations, a considerable minority of physicians reported recommending HPV vaccination based on HPV and Pap test results. If these clinical practices persist, many young adult women will not realize the benefits of HPV vaccination. Additional efforts are needed to ensure all young women are screened and vaccinated appropriately.

Short Summary

In a national study, a considerable minority of family physicians and obstetrician-gynecologists reported using HPV and Pap test results to guide their HPV vaccination recommendations for females ages ≤26 years.

Keywords

cervical cancer; females; human papillomavirus vaccines; Pap test; physicians

Introduction

In the United States, the Advisory Committee on Immunization Practices (ACIP) recommends routine human papillomavirus (HPV) vaccination for females ages 11–12 years and catch-up vaccination up to age 26, regardless of prior HPV exposure.[1] ACIP does not recommend using prevaccination assessments to determine the appropriateness of HPV vaccination;[2,3] thus, physicians should not use Papanicolaou (Pap) or HPV test results to determine whether to offer HPV vaccination, nor should they use vaccine receipt to inform cervical cancer screening practices. Yet, available studies suggest many providers who deliver cervical cancer screening services for women report intended[4] or actual[5,6] practices inconsistent with ACIP recommendations, including failing to recommend HPV vaccine for females with a history of an abnormal Pap test or positive HPV test.

As cervical cancer screening and HPV vaccine guidelines evolve, it is important to understand physicians' current practices and adherence to ACIP recommendations when making HPV vaccine recommendations to young adult female patients. This study characterizes physicians' HPV vaccine recommendations and practices in the context of HPV and Pap testing, and explores differences in adherence to expert recommendations by personal and practice characteristics.

Materials and Methods

Sample and recruitment

The sample and recruitment methods were previously described.[7,8] Briefly, we mailed surveys to nationally representative samples of family physicians (FPs; $n = 746$), pediatricians ($n = 473$), and obstetrician-gynecologists (OBGYNs; $n = 322$) randomly selected from the American Medical Association Physician Masterfile in 2011. We received completed surveys from 928 physicians, including 406 FPs, 322 pediatricians, and 200

OBGYNs. After excluding undeliverable surveys (n = 43) and ineligible respondents (n = 15) from the denominator, the overall response rate was 62.6%. Specialty-specific response rates were 56.7% for FPs, 70.2% for pediatricians, and 64.9% for OBGYNs.

Based on study variables of interest, we excluded pediatricians from the current study because the majority reported that two of the three outcome variables were not applicable to them. We also excluded physicians who reported they do not recommend HPV vaccine (n = 23). Early in the survey, these physicians were instructed to skip several questions pertaining to HPV vaccine recommendations, including two of the three outcome variables for this analysis. Finally, we excluded physicians with missing data for all three outcomes (n = 9). The final analytic sample size of 574 physicians was comprised of 383 FPs and 191 OBGYNs. The University of South Florida Institutional Review Board granted a waiver of documentation of informed consent for this study.

Instrument

Three survey items assessed physicians' HPV vaccine recommendations and practices in the context of HPV and Pap testing. These practice questions were considered indicators of following ACIP recommendations, and an ACIP recommendation-consistent response was deemed correct. The first item asked: "How often do you use HPV testing results to make a decision about whether to recommend the HPV vaccine to your female patients?" (Practice Question 1). Physicians responded using a 5-point scale ranging from never to always. Per ACIP recommendations, and accounting for any rare, yet valid exceptions to the recommendations, a rarely or never response to this item was considered correct. For the second item, we asked physicians: "Among your female patients age 26 years and younger, how often do you recommend HPV vaccination if they had an abnormal Pap test?" (Practice Question 2). Physicians responded using a similar scale as the first item, plus an additional option: *N/A – I don't perform Pap tests*. Physicians who selected this response or had missing data for this item were excluded from analyses for this outcome; otherwise, an often or always response was considered correct. For the third item, we asked physicians: "Do you plan to change the frequency with which you provide Pap test screening to females who have received the HPV vaccine?" (yes, no, don't know, N/A – I don't perform Pap tests; correct response = no) (Practice Question 3). Similar to the previous item, physicians who indicated the item was not applicable or had missing data were excluded from analyses for this outcome. In addition to examining each practice question independently, we assessed the extent to which physicians' practices are aligned with ACIP recommendations by summing correct responses to the three practice questions to create an overall practice indicator (range: 0–3). We examined participants' demographic and practice characteristics as correlates of each practice question and of the practice indicator.

Data analysis

Data were summarized with descriptive statistics using SAS version 9.4 (SAS Institute Inc., Cary, NC). We examined the association between each practice question and participants' demographic and practice characteristics using Fisher's Exact test. Variables that were statistically significant in these bivariate analyses were included in a multivariable logistic regression model. We also examined the association between the practice indicator and

demographic and practice characteristics using Wilcoxon Rank Test for independent variables with two levels, or Kruskal-Wallis test for variables with more than two levels. Variables that were statistically significant in these analyses were included in a regression model. Analyses were completed in 2015.

Results

Over half (56%) of the 574 physicians were male and 41% were ages 50–65 years (Table 1). Most physicians were White/Caucasian (74%) and not Hispanic or Latino (90%). About two-thirds (67%) of physicians were FPs. The highest percentage of physicians reported their practice had 2–15 physicians (64%), was single-specialty (74%), was a private practice (71%), was located in a suburban area (51%), and was in the South (33%). Regarding patient characteristics, 49% indicated over half of their patients were privately insured and 74% indicated the majority of their patients were non-Hispanic White.

Given that the survey was anonymous, we were unable to determine whether survey responders and non-responders were similar on demographic and practice characteristics. However, it was possible to compare responding FPs and OBGYNs to national data on physicians[9] regarding characteristics including sex, age, and region. We found no statistically significant difference in sex between national data and responding FPs ($p = .32$) or OBGYNs ($p = .62$). Regarding age, there was a significant difference between national data and responding FPs ($p < .01$), but not for OBGYNs ($p = .30$). For region, there was no significant difference between national data and responding FPs ($p = .11$) or OBGYNs ($p = .13$).

Individual practice questions

Using HPV test results to guide vaccine recommendations (Practice Question 1)—Across the sample, 80% (458/572) correctly reported rarely or never using HPV testing results to guide HPV vaccine recommendations. In bivariate analyses, physician race, number of physicians and specialties in the practice, and patient race were statistically significantly associated with a correct response to the practice question (Table 1). In multivariable analysis, physician race and number of physicians in the practice retained statistical significance (Table 2). Compared to physicians who were White/Caucasian, physicians who reported they were of another race had lower odds of a correct response (odds ratio [OR], 0.48; 95% confidence interval [CI], 0.29–0.78). Physicians whose practice consisted of 16 or more physicians had higher odds of a correct response compared to physicians practicing alone (OR, 3.30; 95% CI, 1.02–10.75).

HPV vaccine recommendation in light of an abnormal Pap test result (Practice Question 2)—About 66% (357/542) of physicians reported they often or always recommended HPV vaccination to patients with an abnormal Pap test result. Clinical specialty was the only variable significantly associated with a correct response (Table 1). OBGYNs had higher odds of a correct response compared to FPs (OR, 1.53; 95% CI, 1.04–2.25) (Table 2).

Plans to change Pap screening frequency for vaccinated females (Practice Question 3)—About 77% (413/538) did not plan to change Pap test frequency for vaccinated females. Physician age, clinical specialty, and practice type were significantly associated with a correct response to this question (Table 1). All three variables retained statistical significance in the multivariable model. Physicians ages 50–65 years had lower odds of a correct response compared to those ages 30–39 (OR, 0.51; 95% CI, 0.29–0.92). Relative to FPs, OBGYNs had higher odds of a correct response (OR, 1.60; 95% CI, 1.01–2.54). Physicians practicing in a setting other than a private practice office (e.g., urgent care clinic, community health center) had lower odds of a correct response compared to those in private practice (OR, 0.62; 95% CI, 0.39–0.98).

Practice indicator

About 41% (236/574) of physicians reported guideline-consistent practices with all three indicators. The mean indicator score was 2.14 (standard deviation = 0.85; range = 0–3). Age, sex, clinical specialty, practice type, patient payment method, and patient race were significantly associated with practice indicator distribution in bivariate analyses (Table 3). In the multivariable model, OBGYN clinical specialty and private practice type were associated with a higher practice indicator.

Discussion

Despite ACIP recommendations,[2,3] a considerable minority of physicians reported recommending HPV vaccination based on HPV (20%) and Pap test (34%) results. Although HPV vaccines are preventative, and do not reduce disease burden in women already infected with vaccine-type virus, neither Pap tests nor clinically available HPV tests used in women under age 26 generally specify the type of HPV infection, and thus withholding vaccination from women with abnormal Pap or HPV results is not recommended.

Our finding that 80% of physicians rarely or never use HPV testing results to guide HPV vaccine recommendations is similar to previous research documenting that 73–79% of providers sometimes to always recommend HPV vaccine to females with a positive HPV test.[5,6] We also found that about 66% of physicians reported they often or always recommended HPV vaccination to patients with an abnormal Pap test result, compared to 79–85% who sometimes to always did so in previous research.[5,6] Differences in analyses may have accounted for the lower proportion of physicians adhering to this practice recommendation in our study. In our study, we did not consider a sometimes response to reflect sufficiently consistent adherence to practice guidelines. Variation between the current study and previous research also could be due to differences in the provider population studied, with previous research including nurse practitioners, certified nurse midwives, and physician assistants in addition to physicians.[6]

Aligned with published clinical practice guidelines,[10–12] many (77%) physicians in our study did not plan to change Pap frequency for vaccinated females. However, fewer physicians (66%) reported recommending HPV vaccination to patients with an abnormal Pap test result. ACIP guidelines,[1] which are endorsed by the American Academy of Pediatrics (AAP),[13] American Academy of Family Physicians (AAFP),[14] and American

College of Obstetricians and Gynecologists (ACOG),[15] recommend universal vaccination for females through age 26. Our previous work demonstrates physicians look to their professional organizations for guidance on HPV vaccination.[16] Although the AAP, AAFP, and ACOG endorse the ACIP's recommendations for universal HPV vaccination, data from the current study suggest gaps in adherence to these recommendations. It is possible that some physicians use an individualized approach suggested by the American Cancer Society (ACS) recommendations, which state there are insufficient data to recommend for or against universal vaccination of females ages 19–26.[17] For this age group, ACS recommendations advocate that the decision to vaccinate be based on an informed discussion between a woman and her provider about the benefits of HPV vaccination in light of her risk of previous HPV exposure and vaccine cost. The presence of contradictory guidelines, such as the ACIP and ACS recommendations seen here, has been cited as a behavioral barrier to physicians' adherence to practice guidelines.[18]

Further research is needed to understand other knowledge, attitudinal, and behavioral factors[18] that underlie physicians' non-adherence to the ACIP recommendations. Aligned with the awareness-to-adherence model,[19] this research may begin by assessing physicians' awareness of the ACIP recommendations. Lack of familiarity with guidelines[18] and lack of guideline clarity[20] have been cited as barriers to guideline adherence. If non-adherence to the ACIP recommendations is related to these barriers, then knowledge-based interventions focused on increasing awareness and improving guideline clarity can be valuable. Such interventions could take the form of continuing medical education. In the current study, we identified several potential targets for research and interventions, such as FP clinical specialty and physicians in non-private practice settings.

Although awareness of the guidelines is an important first step, awareness alone is unlikely to change practice. Our study highlights gaps in guideline-concordant practices related to cervical cancer prevention and screening in the era of HPV vaccine availability, but deviations from practice guidelines are not unique to this area. Our findings are consistent with research showing primary care physicians' practices depart from guidelines with respect to other preventive services.[21–23] Given that guidelines attempt to assimilate the best available evidence for disease prevention,[24] these findings highlight the need for a greater emphasis on guideline-concordant preventive care delivery. Guideline implementation likely will require a multifaceted approach[24] and computer reminders represent a promising component for successful implementation.[25] Electronic health record prompts already show potential for improving HPV vaccine uptake;[26] incorporating reminders about practice guidelines may also facilitate improved HPV vaccine recommendations.

ACIP recommendations for HPV vaccination were first published in 2007[1] and updated in 2010[2] and 2014.[3] In the context of special situations, including an abnormal Pap test or known HPV infection, the original recommendations underscored that vaccination would provide protection against HPV types not previously acquired.[1] The 2010 recommendations included clearer guidance for vaccination in special situations by specifying that the use of prevaccination assessments (e.g., Pap testing, HPV antibody tests) to determine the appropriateness of vaccination are not recommended.[2] The most recent ACIP recommendations, published in 2014, continue to recommend against using prevaccination

assessments.[3] The current study's data were collected the year following the 2010 recommendations. Future research should focus on assessing current practices, and our data provide an important benchmark to which these data can be compared.

Study strengths include surveying nationally representative samples of physicians and a high response rate of 62.6%. Physician survey response rates tend to be modest, averaging 54%[27] and varying according to subject. Together, the representative samples and response rate enhance the study's generalizability to U.S. physicians who are involved in HPV vaccine dissemination for young women. In light of its strengths, our study is limited by our inability to assess the extent to which physicians may have provided socially desirable responses. The anonymity of the survey may have reduced this bias. Also, we did not offer quantitative anchors or other indicators in the response options for the practice questions, making it challenging to assess how physicians may have interpreted the response options. For instance, some physicians may have interpreted the always response option to mean 100% of the time with no exceptions, whereas other physicians may interpreted this option less rigidly (e.g., accounting for a handful of exceptions). As a result, we also included often responses to allow flexibility, but perhaps sacrificed some precision in our estimates. Our study also may be subject to non-response bias. Although our survey respondents were similar to the national population with regard to sex and region, FPs who responded to our survey tended to be in the older age groups compared to national data. Of note, some research suggests response bias may be less of a concern for surveys conducted with physicians compared to the general population.[28]

By surveying the physician specialties most likely to be involved in HPV vaccination, we were able to better understand the practices of physicians who influence HPV vaccine uptake among young adult women in the United States. This study highlighted missed clinical opportunities for HPV vaccination based on practices that do not follow ACIP recommendations. Future research should clarify the guidelines physicians follow, along with their interpretation of those guidelines. As vaccination rates at recommended ages increase, fewer women will reach young adulthood unvaccinated. However, until this time, appropriate catch-up vaccination of the young adult population is important to prevent HPV-related diseases and cancers. Broad dissemination of clear guidelines that are harmonized across organizations is needed to protect the entire population of young adult women.

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Table 1

Association between sample characteristics and correct responses for each practice question

Characteristic	Total *n* = 574	Practice Question 1 *n* = 572[a]		Practice Question 2 *n* = 542[b]		Practice Question 3 *n* = 538[c]	
	n (%)	n (%) correct	*p*[d]	n (%) correct	*p*[d]	n (%) correct	*p*[d]
Personal characteristics							
Age (years)			.32		.93		.04*
30–39	113 (20)	95 (84)		74 (68)		89 (82)	
40–49	208 (36)	169 (82)		131 (67)		158 (80)	
50–65	236 (41)	183 (78)		145 (66)		154 (71)	
Missing	17 (3)						
Sex			.92		.10		.15
Male	323 (56)	259 (80)		188 (63)		220 (74)	
Female	244 (43)	194 (80)		165 (70)		186 (79)	
Missing	7 (1)						
Race			<.01**		1.00		.55
White/Caucasian	423 (74)	354 (84)		263 (66)		305 (77)	
Other	138 (24)	95 (70)		85 (66)		96 (74)	
Missing	13 (2)						
Ethnicity			.17		1.00		.83
Hispanic or Latino	33 (6)	23 (70)		20 (65)		25 (81)	
Not Hispanic or Latino	518 (90)	417 (81)		322 (66)		372 (77)	
Missing	23 (4)						
Clinical specialty			.66		.03*		.01*
Family Physician	383 (67)	308 (81)		221 (63)		256 (73)	
Obstetrics/Gynecology	191 (33)	150 (79)		136 (72)		157 (83)	
Practice characteristics							
No. of physicians			<.01**		.43		.93
1	135 (24)	101 (75)		84 (65)		97 (76)	
2–15	370 (64)	293 (80)		237 (68)		266 (77)	

	Total $n = 574$	Practice Question 1 $n = 572^{a}$		Practice Question 2 $n = 542^{b}$		Practice Question 3 $n = 538^{c}$	
Characteristic	**n (%)**	**n (%) correct**	p^{d}	**n (%) correct**	p^{d}	**n (%) correct**	p^{d}
16+	62 (11)	58 (94)		34 (60)		45 (79)	
Missing	7 (1)						
No. of specialties			.03 *		.50		.62
Single	424 (74)	330 (78)		273 (67)		309 (76)	
Multiple	124 (22)	108 (88)		71 (62)		90 (79)	
Other	17 (3)	12 (75)		10 (71)		9 (69)	
Missing	9 (2)						
Type			.16		.21		.04 *
Private practice	409 (71)	321 (78)		267 (68)		312 (79)	
Other	157 (27)	130 (84)		87 (62)		97 (70)	
Missing	8 (1)						
Location			.17		.24		.19
Urban	156 (27)	119 (77)		90 (63)		109 (76)	
Suburban	291 (51)	230 (79)		189 (68)		217 (79)	
Rural	110 (19)	96 (87)		70 (66)		73 (70)	
Other	6 (1)	5 (83)		2 (33)		5 (100)	
Missing	11 (2)						
Region			.06		.45		.52
Northeast	106 (18)	86 (81)		68 (68)		79 (80)	
Midwest	149 (26)	128 (86)		96 (67)		111 (78)	
South	189 (33)	141 (75)		119 (68)		136 (78)	
West	116 (20)	92 (80)		66 (59)		78 (72)	
Missing	14 (2)						
Patient characteristics							
Patient payment method							
Private insurance			.24		.23		.10
0–50% of patients	269 (47)	209 (78)		158 (63)		182 (74)	
51–100% of patients	284 (49)	233 (82)		185 (68)		218 (80)	

Characteristic	Total $n = 574$ n (%)	Practice Question 1 $n = 572^a$ n (%) correct	p^d	Practice Question 2 $n = 542^b$ n (%) correct	p^d	Practice Question 3 $n = 538^c$ n (%) correct	p^d
Missing	21 (4)						
Patient race (majority)			.01 *		.17		.10
Non-Hispanic White	422 (74)	348 (83)		260 (65)		315 (79)	
Other	146 (25)	105 (72)		95 (71)		94 (71)	
Missing	6 (1)						

[a] Sample size after omitting respondents with missing data on the outcome ($n = 2$).

[b] Sample size after omitting respondents with missing data on the outcome ($n = 2$) and who reported they do not perform Pap tests ($n = 30$).

[c] Sample size after omitting respondents with missing data on the outcome ($n = 1$) and who reported they do not perform Pap tests ($n = 35$).

[d] P-value from Fisher's exact test.

* $p < .05$,

** $p < .01$

Table 2

Multivariable analysis for each practice question

	Practice Question 1 *n* = 551		Practice Question 2 *n* = 542		Practice Question 3 *n* = 519	
Characteristic	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**
Age (years)	—		—			
30–39					1.00	Ref
40–49					0.87	(0.47–1.59)
50–65					0.51	(0.29–0.92)*
Race			—		—	
White/Caucasian	1.00	Ref				
Other	0.48	(0.29–0.78)**				
Ethnicity	—		—		—	
Hispanic or Latino						
Not Hispanic or Latino						
Clinical specialty	—					
Family Physician			1.00	Ref	1.00	Ref
Obstetrics/Gynecology			1.53	(1.04–2.25)*	1.60	(1.01–2.54)*
No. of physicians			—		—	
1	1.00	Ref				
2–15	1.02	(0.62–1.68)				
16+	3.30	(1.02–10.75)*				
Type	—		—			
Private practice					1.00	Ref
Other					0.62	(0.39–0.98)*
No. of specialties						
Single	1.00	Ref				
Multiple	1.74	(0.91–3.34)				
Other	1.00	(0.30–3.28)				
Patient race (majority)			—		—	

	Practice Question 1 *n* = 551		Practice Question 2 *n* = 542		Practice Question 3 *n* = 519	
Characteristic	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**
Non-Hispanic White	1.00	Ref				
Other	0.63	(0.39–1.02)				

* $p < .05$,

** $p < .01$

— Variable not included in the multivariable model due to lack of statistical significance in the bivariate analyses.

Table 3

Practice indicator distribution and bivariate association with sample characteristics

Characteristic	n	Mean	SD	Bivariate p^a	Multivariable (n = 530) p^b
Personal characteristics					
Age (years)				.043 *	
30–39	113	2.28	0.76		
40–49	208	2.20	0.83		.485
50–65	236	2.04	0.89		.137
Sex				.021 *	.110
Male	323	2.07	0.87		
Female	244	2.23	0.82		
Race				.050	—
White/Caucasian	423	2.18	0.82		
Other	138	2.00	0.91		
Ethnicity				.570	—
Hispanic or Latino	33	2.06	0.86		
Not Hispanic or Latino	518	2.14	0.84		
Clinical specialty				<.001 **	.047 *
Family Physician	383	2.05	0.86		
Obstetrics/Gynecology	191	2.32	0.81		
Practice characteristics					
No. of physicians				.572	—
1	135	2.09	0.83		
2–15	370	2.15	0.86		
16+	62	2.21	0.81		
No. of specialties				.360	—
Single	424	2.15	0.84		
Multiple	124	2.17	0.84		
Other	17	1.82	1.01		

Characteristic	n	Mean	SD	Bivariate p^a	Multivariable (n = 530) p^b
Type				.021 *	.027 *
Private practice	409	2.20	0.81		
Other	157	2.00	0.91		
Location				.386	—
Urban	156	2.04	0.89		
Suburban	291	2.19	0.83		
Rural	110	2.17	0.83		
Other	6	2.00	0.89		
Region				.162	—
Northeast	106	2.20	0.87		
Midwest	149	2.25	0.79		
South	189	2.10	0.86		
West	116	2.03	0.86		
Patient characteristics					
Patient payment method					
Private insurance				.007 **	.154
0–50% of patients	269	2.04	0.87		
51–100% of patients	284	2.24	0.81		
Patient race (majority)				.046 *	.247
Non-Hispanic White	422	2.19	0.82		
Other	146	2.01	0.89		

[a] A Wilcoxon Rank Test was performed for variables with two levels. A Kruskal-Wallis test was performed for variables with more than two levels.

[b] Multivariable analysis was performed using regression.

— Variable not included in the multivariable model due to lack of statistical significance in the bivariate analyses.

* $p < .05$,

** $p < .01$

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