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RESEARCH PAPER

Physician support of HPV vaccination school-entry requirements

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ABSTRACT

School-entry requirements in the US have led to high coverage for several vaccines, but few states and jurisdictions have adopted these policies for human papillomavirus (HPV) vaccination. Because physicians play a key role in advocating for vaccination policies, we assessed physician support of requiring HPV vaccine for school entry and correlates of this support. Participants were a national sample of 775 physicians who provide primary care, including vaccines, to adolescents. Physicians completed an online survey in 2014 that assessed their support for school-entry requirements for HPV vaccination of 11 and 12 y olds. We used multivariable logistic regression to assess correlates of support for these requirements. The majority of physicians (74%) supported some form of school-entry requirements, with or without opt-out provisions. When opt-out provisions were not specified, 47% agreed that laws requiring HPV vaccination for school attendance were a "good idea." Physicians more often agreed with requirements, without opt-out provisions, if they: had more years in practice (OR=1.49; 95% CI: 1.09-2.04), gave higher quality HPV vaccine recommendations (OR=2.06; 95% CI: 1.45-2.93), believed that having requirements for Tdap, but not HPV, vaccination undermined its importance (OR=3.33; 95% CI: 2.26-4.9), and believed HPV vaccination was as or more important than other adolescent vaccinations (OR=2.30; 95% CI: 1.65-3.18). In conclusion, we found that many physicians supported school-entry requirements for HPV vaccination. More research is needed to investigate the extent to which opt-out provisions might weaken or strengthen physician support of HPV vaccination school-entry requirements.

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Introduction

Human papillomavirus (HPV) is responsible for almost all cervical cancers, and will affect an estimated 12,900 US women in 2015 and lead to 4,100 deaths.[1] Persistent HPV infections also cause a significant proportion of other cancers in both men and women, including oropharyngeal and several anogenital cancers.[2] Most HPV-associated cancers are caused by types 16 and 18; as HPV vaccines are highly protective against these strains, most HPV-associated cancers could potentially be prevented.[3,4] The Advisory Committee on Immunization Practices (ACIP) recommends that children ages 11-12 routinely receive 3 doses of HPV vaccine, with catch-up vaccination until age 21 for males and 26 for females.[5] Despite these recommendations, that are based on the demonstrated efficacy and safety of HPV vaccination,[6-9] coverage is low in the US. In 2014, only 40% of females and 22% of males ages 13-17 had received all 3 doses of HPV vaccine.[10] These coverage levels were substantially lower than for other adolescent vaccines, such as tetanus, diphtheria and pertussis (Tdap) that had coverage of 88%.[10]

One factor that, in part, accounts for the differences in adolescent vaccine coverage is that most states have school-entry requirements for Tdap vaccination but not HPV vaccination.[11] Immunization requirements for school entry have led to high coverage rates for many other vaccines in the US, including Tdap, measles, mumps and rubella (MMR), polio, haemophilus (Hib), varicella, and hepatitis B vaccines.[11-13] The Task Force on Community Preventive Services recommends school-entry requirements to increase vaccination coverage in children.[14] Although about half of US states have at some point proposed legislation requiring HPV vaccination for school entry, such a requirement has come into effect only in Virginia and the District of Columbia through legislation, and more recently in Rhode Island through a state health department rule.[15] Laws in Virginia and Washington DC include an opt-out clause, which might lessen their impact on coverage.[16]

Previous studies conducted in 5 southeastern North Carolina counties and in Los Angeles, California reported that 46% and 59% of parents of adolescents supported HPV vaccine school-entry requirements, respectively.[17-18] These studies also reported that support increased when the requirements included opt-out provisions. However, one potential negative consequence of opt-out provisions for HPV vaccination is parents requesting exemptions for other adolescent vaccines, which may contribute to a culture of vaccination refusal.[16] If so, opt-out provisions may undermine school-entry vaccination requirements.

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Data are currently limited regarding physicians' attitudes about such school-entry vaccination requirements with or without opt-out provisions. Adopting school-entry vaccination requirements usually requires a broad coalition, including legislators, state health departments, and immunization champions, with physicians often leading or playing key roles in these efforts. Opposition from physician groups can slow or derail adoption of policies, such as pharmacist provision of HPV vaccination.[19,20] Better understanding of physician attitudes about HPV vaccination requirements can inform states' policy-related efforts. Our study sought to assess the acceptability of HPV vaccination school-entry requirements among a national sample of physicians, describe correlates of physician support for such requirements, and evaluate the effect of including opt-out provisions on support.

Results

Approximately half of the surveyed physicians were pediatricians (53%) and had been in practice for at least 20 y (55%) (Table 1). The majority were in private practices (85%), saw 10 or more adolescent patients per week (83%), and provided 10% or more vaccine doses through the Vaccine for Children (VFC) program (55%). Fewer than 10% were in practices that did not stock HPV vaccine regularly, and about 12% practiced in clinics that had a policy allowing dismissal of patients or families that continued to refuse recommended vaccines.

Overall, 47% of physicians agreed with the general statement that laws requiring HPV vaccination for school attendance are a good idea (Table 2). When asked whether such laws were only okay if parents are able to opt out, 18% supported school-entry requirements only without opt-out provisions (agree to "I think these laws are a good idea" and disagree to "okay only if parents can opt out"), while 8% switched to neither agree nor disagree. Forty seven percent of physicians agreed with the statement that it is okay to have these laws if parents can opt out if they want to. Eighteen percent of physicians supported school-entry requirements only with opt-out provisions (disagree to "I think these laws are a good idea" and agree to "okay only if parents can opt out"). In total, 74% of physicians agreed with at least one statement of support for school-entry requirements (either with or without opt-out provisions), and only 12% of physicians did not support such requirements under any circumstances (disagree to both statements).

In multivariate analyses, 4 variables were associated with agreement that HPV vaccine requirement laws "are a good idea" (Table 3). Physicians who had been in practice longer (≥20 years) more often agreed with these laws than physicians who had been in practice for less time (OR=1.49, 95% CI, 1.09-2.04). Support for these laws was more common among physicians who described giving high-quality HPV vaccine recommendations (OR=2.06, 95% CI, 1.45-2.93) and those who rated the importance of HPV vaccine as at least on par with Tdap and meningococcal vaccines (OR=2.30, 95% CI, 1.65-3.18). Support was also more common among physicians who agreed that having a requirement for Tdap vaccine, but not for HPV vaccine, undermined the importance of immunization against HPV (OR= 3.33, 95% CI, 2.26-4.90).

Table 1. Physician and practice characteristics (N = 775).

	n	%
Demographic characteristics		
Female	250	32
Medical specialty		
Pediatrics	410	53
Family medicine	365	47
Years practicing medicine		
<20 years	351	45
≥20 years	424	55
Patients ages 11-17 seen per week		
< 10	129	17
10-24	350	45
> 24	296	38
Practice characteristics		
Private practice		
No	115	15
Yes	650	85
Number of physicians		
1	115	15
2-4	283	36
5-9	217	28
≥10	160	21
Vaccines provided that are financed by VFC		
0-9%	290	37
10-49%	273	35
50% or greater	152	20
Not sure	60	8
Regularly stocks HPV vaccine		
No	73	9
Yes	702	91
Dismisses families who continue to refuse adolescent vaccines[1]		
No	684	88
Yes	91	12
Region		
Northeast	184	24
Midwest	165	21
South	274	35
West	152	20

Note. VFC=Vaccines for Children program. HPV=human papillomavirus
[1]Have a policy to dismiss patients or families who continue to refuse Tdap, meningococcal, or HPV vaccination.

Bivariate analyses found support for HPV vaccination school-entry requirements correlated with a "presumptive" style of recommendation, meaning that physicians began conversations about HPV vaccine with a statement that the child was due for the vaccine, rather than eliciting questions or giving information. Support of having trained pharmacists deliver HPV vaccines also correlated with support of school-entry requirements for HPV vaccination. However, neither variable remained statistically significant in multivariable analysis.

Discussion

Physicians are highly respected authorities on HPV vaccination, with their recommendations being the strongest predictor of parents' acceptance of the vaccine for their adolescent children.[21-24] Physicians also play a key role in advocating for the adoption of vaccination laws and policies, including school-entry requirements. Our national study found that most pediatricians and family physicians (74%) supported some form of school-entry requirement for HPV vaccine, though the inclusion of opt-out provisions played a complex role in support. Support for school-entry HPV vaccination requirements was higher among more experienced physicians who valued the

Table 2. Physician support of HPV vaccination school-entry requirements (N = 775).

"Some states are trying to pass laws that would require all 11 and 12 year-olds to get HPV vaccine before they are allowed to start sixth grade."		"I think these laws are a good idea."			
		Agree (%)	Neither agree nor disagree (%)	Disagree (%)	Total (%)
"It is okay to have these laws only if parents can opt out if they want to."	Agree	163 (21)	65 (8)	139 (18)	367 (47)
	Neither agree nor disagree	60 (8)	59 (8)	38 (5)	157 (20)
	Disagree	143 (18)	16 (2)	92 (12)	251 (32)
	Total	366 (47)	140 (18)	269 (35)	775 (100)

Note. 74% (n=570) of physicians agreed with some form of HPV vaccination school-entry requirement (47% [first column total; Response of "agree" to "I think these laws are a good idea."] + 8% [Response of "neither agree nor disagree" to "I think laws these laws are a good idea" and "agree" to "It is okay to have these laws only if parents can opt out if they want to"] + 18% [Response of "disagree" to "I think laws these laws are a good idea" and "agree" to "It is okay to have these laws only if parents can opt out if they want to"]). May not sum to totals because of rounding. HPV=human papillomavirus.

vaccine, and who gave higher-quality recommendations to patients.

Almost half (47%) of physicians supported HPV vaccination school-entry requirements when the survey did not mention an opt-out provision. This was slightly higher than the 42% support for "mandated HPV vaccination" in a 2008 survey of Texas physicians[25] and comparable to previous studies of US parents when no opt-out was mentioned (46% in North Carolina[17] and 59% in Los Angeles[18]). At face value, this moderate level of support may explain why few states have pursued such requirements.

Previous studies of US parents have shown that mentioning an opt-out provision for HPV vaccine school-entry requirements increased support to 92%, which is both promising and problematic.[18] However, we found similar support among primary care physicians (47%) regardless of opt-out provisions, with a large number switching positions from for to against, and vice-versa. It would appear that some physicians would support the requirements only if there was no easy opt-out. Opt-out provisions were legislated in 2 of the 3 states that have HPV vaccination school-entry requirements and are likely to be important in passing similar laws in other states.[26] Our study highlights the need to determine how different stakeholders understand this policy language, in addition to implications for vaccine uptake and effectiveness.

Little research has examined parents' use of vaccination opt-outs, exemptions and refusals to follow the requirements with regard to HPV vaccination. A model-based study estimated that school-entry requirements for HPV vaccination could reduce the time it will take the US to reach 70% HPV vaccination coverage from 23 y to 8 y.[27] However, while school-entry requirements for vaccination of young children have generally been effective in the US, they have largely failed for HPV vaccination.[28] It appears that allowing parents to opt-out, which may increase acceptability and contribute to family's autonomy, decreases the effectiveness of the HPV vaccination requirements.[16,29] People opting out in large numbers likely contributed to the disappointing impact of Virginia and the District of Columbia's school-entry requirements on HPV vaccination coverage.[16]

While our findings offer one of the first looks at physician attitudes on HPV vaccine opt-out provisions, some information regarding attitudes toward departures from routine vaccination practice is available. A recent study from Kempe and colleagues[30] found that physicians often favor parental autonomy over best practice; although 87% of physicians felt that spreading out vaccines (including HPV vaccine) put children at risk, 72% agreed to an alternative schedule to foster greater trust between physician and family. Evidence also suggests that physicians are more comfortable with refusals or exemptions for some vaccinations than others,[31] with some physicians considering HPV vaccine to be more "optional" than other vaccines.[32-34] Furthermore, health care providers in Arizona had low support (37%) for a policy requiring them to sign off on parent's decision to refuse vaccination.[31] It would be valuable to gather qualitative data on how physicians think about requiring HPV vaccination as well as permissive and strict opt-out provisions.

Correlates of support paint a picture of experienced physicians who value HPV vaccine and might be good leaders and spokespersons for advocacy efforts. In the present study, the strongest predictor of support for HPV vaccination school-entry requirements was recognizing the importance of consistent policy and messaging (agreement that "Having a school-entry requirement for Tdap vaccine, but not for HPV vaccine, makes some parents think HPV vaccine is less important"); this further suggests that physicians recognize the weight of legislation in vaccine discussions with individual patients. Other predictors include having more years in practice, believing that HPV vaccine is as or more important than other adolescent vaccines, and giving high-quality HPV vaccine recommendations. Although previous studies have reported that physicians find communication about HPV vaccine can be burdensome,[25,35] neither anticipation of discomfort surrounding discussion of a sexually transmitted infection nor higher time burden compared to other vaccines were associated with physician support of school-entry requirements. This is particularly important because physician recommendation remains the strongest known predictor of HPV vaccination,[36] suggesting that physician support of HPV vaccination school-entry requirements is not expected to replace this important discussion.

Strengths of our study include our large, national sample of primary care physicians. Study limitations included relying on physicians' self-report of their clinical practices, such as HPV

Table 3. Correlates of physician support of HPV vaccination school-entry requirements (N = 775).

	# of respondents who agreed with the statement "I think these laws are a good idea"/ Total in category (%)	Bivariate OR (95% CI)	Multivariable OR (95% CI)
Physician attitudes about HPV vaccines			
Requirements for Tdap vaccine make HPV vaccine seem less important			
Did not agree	50/198 (25)	Ref	Ref
Agree	316/577 (55)	3.58 (2.50-5.14)	3.33 (2.26-4.90)
Relative importance of HPV vaccine to physicians[1]			
Less important	138/392 (35)	Ref	Ref
As or more important	228/383 (56)	2.71 (2.02-3.62)	2.30 (1.65-3.18)
Perceived relative importance of HPV vaccine to parents[1]			
Less important	299/646 (46)	Ref	—
As or more important	67/129 (52)	1.25 (0.86-1.83)	—
Quality of current HPV vaccine recommendation practices			
Low	146/418 (35)	Ref	Ref
High	220/357 (62)	2.99 (2.23-4.01)	2.06 (1.45-2.93)
Used presumptive style for HPV vaccine recommendation			
No	227/539 (42)	Ref	Ref
Yes	139/236 (59)	1.97 (1.44-2.69)	1.30 (0.95-1.81)
HPV vaccine conversations uncomfortablebecause of having to talk about sex			
Did not agree	239/526 (45)	Ref	—
Agree	127/249 (51)	1.25 (0.92-1.69)	—
Takes more time to discuss HPV vaccine[1]			
No	147/338 (43)	Ref	—
Yes	219/437 (50)	1.31 (0.98-1.74)	—
Pharmacists provision of HPV vaccine benefits adolescents past due			
Did not agree	204/470 (43)	Ref	Ref
Agree	162/305 (53)	1.48 (1.11-1.97)	1.31 (0.95-1.81)
Physician characteristics			
Sex			
Male	256/525 (49)	Ref	—
Female	110/250 (44)	0.83 (0.61-1.12)	—
Medical subspecialty			
Pediatrics	195/410 (48)	Ref	—
Family medicine	171/365 (47)	0.97 (0.73-1.29)	—
Years practicing medicine			
<20 years	149/351 (42)	Ref	Ref
≥20 years	217/424 (51)	1.42 (1.07-1.89)	1.49 (1.09-2.04)
Patients ages 11-17 seen per week			
<10	65/129 (50)		
10-24	157/350 (45)	0.80 (0.54-1.20)	—
≥25	144/296 (49)	0.93 (0.61-1.41)	—
Practice characteristics			
Private practice			
Yes	306/650 (47)	Ref	—
No	60/115 (52)	1.26 (0.85-1.88)	—
Number of physicians			
1	48/115 (42)	Ref	—
2-4	135/283 (48)	1.27 (0.82-1.97)	—
5-9	99/217 (46)	1.17 (0.74-1.85)	—
≥10	84/160 (53)	1.54 (0.95-2.50)	—
Vaccines provided that are financed by VFC			
0-9%	138/290 (48)	Ref	—
10-49%	125/273 (46)	0.93 (0.67-1.30)	—
≥50%	78/152 (51)	1.16 (0.78-1.72)	—
Not sure	25/60 (42)	0.79 (0.45-1.38)	—
Regularly stocks HPV vaccine			
No	33/73 (45)	Ref	—
Yes	333/702 (47)	1.09 (0.67-1.78)	—
Region			
Northeast	82/184 (47)	Ref	—
Midwest	81/165 (49)	1.20 (0.89-1.59)	—
South	128/274 (47)	1.09 (0.75-1.59)	—
West	75/152 (49)	1.21 (0.79-1.86)	—
Dismisses families who continue to refuse adolescent vaccines[2]			
No	325/684 (48)	Ref	—
Yes	41/91 (45)	0.91 (0.58-1.41)	—

Note. VFC=Vaccines for Children program; HPV=human papillomavirus; Ref = Referent group; Dashes (–) indicate the variable was not included in the multivariable model because it was not statistically significant at the bivariate analysis.

[1]Relative to Tdap and meningococcal vaccines

[2]Clinics with a 'yes' answer have a policy that may dismiss patients or families if they continue to refuse any or all of the following vaccines: Tdap, meningococcal, HPV.

vaccine recommendation quality, which may over- or underestimate the frequency of these practices. The study had a modest response rate, which is a common challenge in physician surveys. As we studied only pediatricians and family physicians, we do not know whether the findings are generalizable to other physicians who provide HPV vaccine such as gynecologists; and we do not know how other important members of primary care, such as nurse practitioners and physician assistants, would view these requirements.

Conclusion

Voluntary school-located provision of HPV vaccine has quickly led to impressive coverage in other developed countries,[37,38] but this approach has been challenging in the US. Alternatively, some US experts continue to consider school-entry requirements. One line of thinking is that HPV vaccination school-entry requirements are not for general use, but instead that they are best for states that have already achieved high vaccination rates, like Rhode Island which is the state to most recently adopt a requirement. Another suggestion has been that shifting vaccine policymaking from a purely legislative process to one involving health officials, as allowed by health codes in many states, might engender more public trust and support.[39] In the present study, nearly 3 quarters of primary care providers supported some form of school-entry requirement for HPV vaccination among 11 and 12 y olds. Thus, physicians expressing general opposition to the requirements in any form was uncommon. Support correlated with high quality of current HPV vaccine practices, high value placed on the vaccine, recognition of the role of policy in vaccine messaging, and years of experience. Further research is needed to investigate the extent to which opt-out provisions might weaken or strengthen support of school-entry requirements on HPV vaccination among health care professionals.

Materials and methods

Participants and procedures

Study participants were members of an existing national panel of physicians, maintained by a survey research company.[40] The current study was limited to pediatricians and family physicians who provided preventive care, including vaccination, to adolescent patients ages 11-12. From April to June 2014, the survey research company sent invitations to 2,368 panel members who met preliminary eligibility criteria. Of the physicians invited, 1,022 (43%) accessed the survey site, 776 (76%) of whom met eligibility criteria and completed the survey. After excluding one participant who did not provide data on the outcome variable, the final analytic sample consisted of 775 physicians. Respondents provided informed consent and completed the survey online. They received compensation of $25 to $45 for taking the survey, with higher amounts paid toward the end of the study to encourage participation. The University of North Carolina Institutional Review Board approved the study protocol.

Measures

Support for school-entry requirements

The survey introduced the concept of school-entry requirement for HPV vaccination with this text, "Some states are trying to pass laws that would require all 11 and 12 year-olds to get HPV vaccine before they are allowed to start 6th grade." The first survey item assessed support for school-entry requirements without mention of an opt-out provision: "I think these laws are a good idea." The second item specifically mentioned an opt-out provision: "It is okay to have these laws only if parents can opt out if they want to." The language used in these 2 items matched previous survey measures assessing support for HPV vaccination school-entry requirements among parents.[17-18] Both items used 5-point response scales. We dichotomized responses as agreeing (strongly agree or somewhat agree) and not agreeing (strongly disagree, somewhat disagree, or neither agree nor disagree).

Correlates

The survey assessed HPV vaccine recommendation quality on the following dimensions: gender-specific timeliness, consistency, urgency, and strength of endorsement. Timeliness was assessed by questions regarding the age at which the provider currently recommends HPV vaccine to males (before or after age 13) and to females (before or after age 13). Consistency was assessed by whether physicians used a risk-based approach, rather than the recommended age-based approach, to selectively recommend HPV vaccine. Urgency was assessed by whether physicians recommended HPV vaccine at the current visit, versus at a later visit. Lastly, strength of endorsement was assessed by physician self-report of importance of HPV vaccine for 11- to 12- year olds on a 5-point response scale that ranged from not important to extremely important. We used the approach of Gilkey and colleagues[41] to combine these 5 items to create an overall index of recommendation quality by awarding one point for each indicator of quality. Following Gilkey et al.,[41] we classified scores of 0-3 as "low quality" and 4-5 as "high quality."

To evaluate perceived importance of HPV vaccine requirements relative to a vaccine with established school-entry requirement, the survey assessed agreement with the statement: "Having a school-entry requirement for Tdap vaccine, but not for HPV vaccine, makes some parents think HPV vaccine is less important." This item had a 5-point response scale, ranging from strongly disagree to strongly agree, which we dichotomized to reflect agreement or lack of agreement with the statement. The survey also assessed importance of HPV vaccination with the following statement: "When I recommend HPV vaccine for 11-12 y olds, I say it is…," with a response scale that ranged from not important to extremely important. The survey repeated the same statement for meningococcal and Tdap vaccines. We calculated relative vaccine importance, giving a score of 1 when physicians rated HPV vaccine as important as, or more important than, the average score for Tdap and meningococcal vaccines and 0 otherwise.

The survey assessed the time physicians reported needing to talk to 11-12 y olds about the 3 vaccines. We calculated whether it took more time to recommend HPV vaccine

when compared to Tdap and meningococcal vaccines, or the same or less time. The survey also assessed physicians' vaccine recommendation style. We coded responses as "presumptive" if physicians began the conversation about HPV vaccine by saying the child was due, rather than soliciting questions or offering information first. The survey assessed physician discomfort with the conversation about HPV vaccination with 2 questions, one asking generally if physicians anticipated an uncomfortable conversation when recommending HPV vaccine, and another which specifically asked whether having to talk about sexually transmitted infections made conversations about HPV vaccine uncomfortable. The survey also assessed support for pharmacist provision of HPV vaccines with the statement "It benefits 13-17 y olds who are past due for HPV vaccine to receive it from specially trained pharmacists."

The survey assessed physicians' sex, medical specialty, years in practice since residency training, region where they practice medicine (based on US Census classifications), practice setting (private practice vs. other), number of clinicians in the clinic, number of adolescent patients seen in a typical week, and the percentage of vaccine doses provided through the federally-funded VFC program that provides free vaccines to underserved populations.

Data analyses

We calculated proportions for the primary ("these laws are a good idea") and secondary (inclusion of opt-out provisions) outcome variables and by participants' characteristics and attitudes about the vaccine. We calculated odds ratios (ORs) and 95% confidence intervals (CIs) using bivariate logistic regression to examine correlates of support for school-entry requirements. We then entered variables that were statistically significant ($P < .05$) into a multivariable regression model. Analyses used SAS version 9.4 (Cary, NC) and used 2-tailed tests with a critical α of 0.05.

Abbreviations

ACIP	Advisory Committee on Immunization Practices
HPV	Human papillomavirus
Hib	Polio haemophilus
MMR	Measles, mumps & rubella
Tdap	Tetanus, diphtheria & pertussis
VFC	Vaccines for Children

Disclosure of potential conflicts of interest

Brewer has received HPV vaccine-related grants from or been on paid advisory boards for Merck, GlaxoSmithKline, and Pfizer; he served on the National Vaccine Advisory Committee Working Group on HPV Vaccine and is chair of the National HPV Vaccination Roundtable. The other authors have no financial disclosures or potential conflicts of interest to report.

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