RESEARCH PAPER

Parents' perceptions of provider communication regarding adolescent vaccines

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ABSTRACT

Strong provider recommendations for adolescent vaccines are critical for achieving high vaccination levels. However, little is known about parents' preferred provider communication strategies for adolescent vaccines in general, and for human papillomavirus (HPV) vaccines specifically. We performed a cross-sectional survey of 800 parents of 9–14 year olds in April 2014 to assess current adolescent vaccine communication practices by providers, parents' preferred HPV vaccine-specific communication strategies, and the association of these two outcomes with experiential, attitudinal and demographic characteristics. Among the 356 parents in the study (response rate 48%), HPV vaccines were reported as less likely to have been "very strongly" recommended by their adolescent's provider (39%) than other adolescent-targeted vaccines (45%–59%, $p < 0.05$ for all comparisons). Receiving a very strong recommendation for HPV vaccines was associated with a higher likelihood of vaccine receipt (71% versus 39%, $p < 0.001$), or among those not yet vaccinated, increased likelihood of positive vaccination intentions (82% vs. 60%, $p = 0.015$). Nearly all parents (87%) reported that, if available, they would use a website providing personalized HPV vaccine-related materials before their adolescent's next check-up, and other technology-based communications were also endorsed by the majority of parents. From these data we conclude that parents received weaker recommendations for HPV vaccines than other adolescent vaccines, and that most parents want additional HPV vaccine-related materials, preferably delivered using a variety of technology-based modalities which is not their providers' current practice.

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Introduction

Of the four vaccines recommended for adolescents (tetanus-diphtheria-acellular pertussis [Tdap], meningococcal conjugate [MCV]; human papillomavirus [HPV]) and influenza, only Tdap and MCV vaccines have reached coverage levels at or near national goals.¹ Over the last 4 years, low uptake of HPV vaccine has become a particular concern as coverage levels (≥ 1 dose) among females have remained nearly the same from 2011–2014 (53.0% to 60.0%). Vaccination coverage for males is even lower (41.7% as of 2014 for series initiation), as is completion of the 3-dose series (39.7% for females, 21.6% for males as of 2014).¹

Past research has demonstrated the critical role that provider recommendation plays in the uptake of HPV vaccine among adolescents.^{2–4} The content and tone of this recommendation influences parental attitudes about the vaccine,^{5,6} and is highly associated with HPV vaccine series initiation and completion for both boys and girls.⁶ When a "strong" recommendation for the vaccine is given, the likelihood of vaccine administration can increase by up to 5 fold.² However, there are well established differences between how providers recommend HPV vaccines compared to other vaccines for adolescents. For example, Gilkey et al demonstrated that only 13% of a national sample of pediatricians and family medicine providers believed that parents thought HPV vaccines were "highly important, compared to 74% and 62% for Tdap and MCV vaccines, respectively. Consequently, the proportion of providers

who reported recommending HPV vaccines as "highly important" for adolescent patients was significantly lower for HPV (73%) than for Tdap (95%) and MCV vaccines (87%, $p < 0.001$). In a related study, Gilkey et al defined components a high quality HPV vaccine recommendation (strong endorsement, recommending routinely, at age 11–12, and to be given on the same day as discussed) and found that few providers nationally follow these practices.⁷ Given the low or stagnant levels of HPV vaccination among both male and female adolescents, and research demonstrating significant deficits in provider HPV vaccine recommendation behaviors, there has been increased interest among the medical and public health communities in finding ways to improve provider communication about adolescent HPV vaccination. Ideally, such strategies would result in the majority of providers giving "strong" recommendations as a matter of routine, especially to 11–12 year olds for whom the vaccine is preferentially recommended.^{8,9}

"Provider communication" about vaccines can describe many forms of conveying information including: individual discussions with the provider during the clinic visit, office-based informational campaigns such as wall posters, pamphlets or mailed information, and electronic communication such as email or text messages, or preferred web-based educational resources. Despite increased recognition of the importance of provider communication about vaccines, there is a paucity of research describing the communication modalities currently used by providers, or of new methods of communication that

may be preferred by patients and parents, but are not used currently. In addition, past research shows that there is often discordance between what the provider believes they are communicating to a patient and what the patient takes away from the encounter.¹⁰ Because parent consent is generally required for HPV vaccines to be administered to adolescents, an important aspect to consider when examining effective provider communication about HPV vaccines is parents' *perceptions and recollection* of this information. To address these knowledge gaps, the goals of this study were three fold: 1) to describe parents' of adolescents perspectives on current provider communication practices about adolescent vaccines in general, and HPV vaccines specifically; 2) to understand parents' acceptability of and interest in additional methods their providers could use to communicate about HPV vaccines; and 3) to understand how current provider communication practices about HPV vaccines impact these parents' vaccination attitudes and the uptake of HPV vaccines among their adolescent children. We hypothesized that the need for effective provider communication strategies would be higher for HPV relative to other adolescent vaccines, and that a strong provider recommendation for the HPV vaccine would be associated with more positive attitudes about this vaccine and a higher likelihood of HPV vaccination.^{5,6,11}

Results

Study sample

Of the 800 parents contacted, 739 appeared to have valid addresses and 356 returned the survey for an adjusted response rate of 48%. Among the 16 practices used for recruitment, response rates varied from 20–66%. There was no difference in response rate between participants recruited from family medicine versus pediatrics practices, or between practices who offered the vaccine routinely at age 9 vs. age 11. However, the proportion of respondents was significantly higher among those recruited from private practices compared with public clinics (54% vs. 29%, $p < 0.01$). As shown in **Table 1**, the majority of respondents were married women, with a high level of education and income. Although all respondents were verified using the practices' medical records to have young adolescent children, the young adolescent did not reside in the respondent's household in 14% of cases. Consistent with our sampling strategy, parents reported nearly all young adolescents (86%) had had a check-up within the last 12 months (96% within the last 24 months). There were no statistically significant differences between respondents and non-respondents with respect to child gender, age and whether a well-child visit had occurred within the last 2 years.

General vaccine communication strategies

In-clinic posters (70%) and handouts (78%) were the most commonly recalled forms of communication used by the young adolescent's provider's office regarding adolescent vaccines in general. More parents recalled receiving reminders (text, email or phone) for routine physical exams (36%) than for future needed (30%) or overdue (19%) vaccines. Half of the parents

Table 1. Characteristics of study participants, $n = 356$.

Characteristic	Column-%	n
Parent age		
<40 years	24%	83
41–49 years	58%	199
50+ years	18%	61
Number of adolescents living in household currently		
0	14%	49
1	44%	156
2	35%	123
3+	8%	28
Gender of parent		
Male	9%	32
Female	91%	322
Race of parent		
White	79%	270
Black	5%	16
Other	17%	57
Hispanic ethnicity	23%	79
Education status of parent		
< High School	7%	26
High school grad/GED	13%	44
Some college	19%	65
College grad/Advanced degree	62%	216
Marital status		
Married/marriage-like relationship	81%	284
Single	10%	34
Divorced/Widowed/Other	9%	31
Household income		
<\$50k	26%	94
\$50k–\$99k	21%	75
\$100k +	42%	148
Prefer not to answer	11%	39
Proportion with male adolescent in household ^{a,b}	56%	200
Proportion with female adolescent in household ^{a,c}	54%	194
Adolescent age		
<13 years ^e	49%	174
13–14 years	51%	182
Gender of adolescent		
Male	53%	187
Female	47%	169
Insurance type for adolescent		
Public	27%	93
Private	72%	252
Other/none	1%	5
Adolescent with "chronic health problem" ^d	23%	81
Adolescent check up during the past 12 months	86%	305

Percentages may not sum to 100 due to rounding. Study occurred April 2014. Skipped responses and responses of "don't know" are excluded when they total < 5%.

^a Non-mutually exclusive categories

^{b,c} 49 participants skipped each of these questions.

^d Defined as "a health condition or health problem that lasted longer than three months."

^e for all but two practices the lower age limit of the young adolescent under consideration was 11 years. Two practices reported routinely giving HPV vaccine to 9–10 year olds.

indicated that their young adolescent's provider's office encouraged them to access vaccine information online, for example from their office's or other's websites.

While the majority (91%) of parents indicated that their young adolescent's medical provider had given them information about vaccines in the past, a high proportion of parents also indicated receiving this information from the nurse or medical assistant (68%). Receipt of such information from front desk staff (10%) or a health educator (8%) was relatively uncommon.

Table 2. Parents recall of provider recommendation strength of different adolescent vaccines, n = 356.*

Vaccine	Strength of Provider Recommendation, Row% (n)					p-value of vaccine recommendation compared to HPV**
	Very Strongly	Somewhat Strongly	Not Very Strongly	Recommended AGAINST the Vaccine	Not Applicable – Vaccine was not Discussed	
Tdap	59% (202)	24% (83)	9% (29)	0	8% (27)	<0.001
MCV	45% (152)	26% (88)	12% (39)	0	17% (58)	0.011
Flu	53% (181)	29% (100)	13% (46)	<1% (1)	5% (17)	0.004
HPV	39% (133)	34% (117)	15% (53)	1% (2)	11% (38)	–

*Skipped responses are excluded. Study occurred April 2014.

**Comparisons excluded those who indicated the vaccine was not discussed

At the young adolescent's most recent check-up, the medical provider was the most frequently reported initiator of the vaccine conversation (70%), though adolescent vaccines were reported as not being discussed at the most recent check up by 19% of parents. It was rarely reported that the young adolescent was the one to bring up the topic of vaccines at the most recent check-up (0.6%), or during any medical visits in general that had occurred since age 9 years (8%).

Vaccine recommendations for different adolescent vaccines

As shown in **Table 2**, there were significant differences in the perceived strength of recommendation from their young adolescent's provider based on the type of vaccine. Tdap vaccine was the most likely to be "very strongly" recommended while HPV vaccines were the most likely to be "not very strongly" recommended ($p < 0.05$ for all comparisons). Additionally, two parents recalled their young adolescent's provider recommending *against* the HPV vaccine, and 1 against the Influenza vaccine. There were no differences in strength of recommendation for any vaccine based on any clinical characteristics assessed (i.e. family medicine vs. pediatrics, public vs. private, recommending HPV routinely at 9 vs. 11).

Parents were instructed to imagine that their medical provider "strongly recommended" each of the 4 adolescent vaccines, and that their young adolescent was in need of the vaccines (regardless of the young adolescent's actual vaccination status). When queried as to whether or not they "would need more information before making a decision about the vaccine for [their] adolescent" parents most frequently endorsed needing more information for HPV vaccines (56%) compared to the other vaccines (Tdap – 19%; MCV – 37%; Influenza – 11%, $p < 0.001$), indicating higher informational needs for HPV than for other adolescent vaccines.

HPV vaccine communication

Among the 282 parents who recalled discussing the HPV vaccine previously with their adolescent's provider, 57% indicated the discussion lasted 4 minutes or less, 28% spent 5–9 minutes and 14% spent 10 minutes or more. Parents with lower informational needs were significantly more likely to have had a discussion with the provider about HPV vaccination than parents with high informational needs (data not shown).

In terms of HPV vaccine communication strategies *currently* used in their adolescent provider's office, 60% of parents

indicated the provider used the Center for Disease Control and Prevention's (CDC) HPV Vaccine Information Statement, whereas a smaller proportion (23%–26%) indicated the use of written materials from the vaccine manufacturer, from outside resources, or created by their young adolescent's provider's office. A high proportion of parents were supportive of their young adolescent's clinician's office adopting additional communication techniques to discuss HPV vaccine. Specifically, 96% of parents believed that a website providing "reliable, unbiased information tailored to [their] questions and concerns about HPV and the HPV vaccine...before [their] adolescent's next visit" with the provider would be somewhat or very useful to parents in general, and 87% indicated they would definitely or probably personally use such a website if provided via an email link. In addition, a 1-page list of 'frequently asked questions' developed by providers in the office, a 2-page interactive worksheet to "help organize thoughts about the pros and cons to getting the HPV vaccine," and "a folder of pictures or drawings of the medical problems caused by HPV infection" was endorsed as being definitely or probably used personally by 92%, 58% and 63% of parents, respectively. Parents were generally more likely to personally endorse using these additional means of HPV vaccine communication if they also had high informational needs for HPV compared to those with lower informational needs (data not shown).

Forty-seven percent of parents indicated that their adolescent had received 1 or more doses of HPV vaccine at the time of the survey. Among the 185 parents whose adolescent had not received any prior HPV vaccine doses, 67% indicated they would be somewhat or very likely to have their adolescent vaccinated against HPV at their next check-up. As shown in **Table 3**, very strong provider recommendations for HPV vaccine were correlated with more positive attitudes about the efficacy, safety, and necessity of the vaccine. HPV vaccination attitudes were also more positive among parents reporting that their young adolescent had received a dose of HPV vaccine in the past ($p < 0.01$ for all comparisons of pro vs. anti-vaccination attitudes by vaccination status).

In addition, very strong provider recommendation was also significantly associated with HPV vaccine receipt and, among those without prior doses, vaccine intention (**Table 4**). Parental report of the provider very strongly recommending the vaccine did not differ by any parent or child demographic characteristics, but was generally higher among parents reporting more proactive vaccine communication activities by their young adolescent's provider's office (e.g. use of reminders/recall, posters/

Table 3. Relationship between strength of provider's recommendation for HPV vaccine and parents' HPV vaccine-related attitudes, n=356.

Attitude Statement	Provider Very Strongly Recommended HPV Vaccine, Column-% (n), n=133	All Other Provider Recommendation Categories Column-%, (n), n=210	p-value
I have concerns about the safety of HPV vaccine			
Strongly Agree/Agree	40% (52)	61% (124)	<0.001
Strongly Disagree/Disagree	60% (78)	39% (78)	
I have concerns about the cost of the vaccine			
Strongly Agree/Agree	17% (22)	24% (47)	0.139
Strongly Disagree/Disagree	83% (108)	76% (151)	
I do not think the vaccine works very well.			
Strongly Agree/Agree	9% (11)	20% (37)	0.006
Strongly Disagree/Disagree	91% (116)	80% (147)	
I do not think that my adolescent needs the vaccine now			
Strongly Agree/Agree	23% (30)	50% (99)	<0.001
Strongly Disagree/Disagree	77% (100)	51% (101)	
I do not think my adolescent will need the vaccine ever			
Strongly Agree/Agree	11% (14)	26% (52)	<0.001
Strongly Disagree/Disagree	89% (114)	74% (146)	

Percentages may not sum to 100 due to rounding. Study occurred April 2014.
Skipped responses are excluded.

pamphlets, different types of office staff providing vaccine information – data not shown).

Discussion

Strong provider recommendation for vaccines has been shown in numerous studies to be a key factor in parents' vaccine decision-making.^{2-7,11} Our study demonstrates that parents perceive differential recommendations for the 4 vaccines recommended for adolescents, with HPV vaccines being the least likely to have been "very strongly" recommended for their adolescent. Although there are well established demographic disparities in HPV vaccine utilization,^{1,12-14} there were few differences by demographic characteristics assessed in our study in the proportion of parents receiving very strong recommendations for three of the four vaccines (Flu vaccine recommendation varied by ethnicity and education level). However, for HPV vaccines, receiving a very strong recommendation from the provider was associated with increased likelihood of vaccine receipt, or among those who had not yet received any HPV vaccine doses, vaccination intention. Parents reported widespread use of written informational materials about HPV vaccines by their adolescent providers, but nearly all parents in the study

were also interested in receiving HPV vaccine-related information through additional sources such as web-based material provided before their adolescent's next check-up.

When faced with hypothetical vaccine decisions for the 4 adolescent-targeted vaccines, parents in this study endorsed higher informational needs to make decisions about HPV vaccination than for any of the other vaccines assessed. This was true even among a majority of parents whose adolescent had *already* received HPV vaccine doses. Presumably parents decidedly against HPV vaccination would not need additional information as their decision was already made. Thus, the fact that many parents in our study still wanted additional information about HPV vaccines could suggest that their opinions about the vaccine were still forming. It is among these "fence sitter" parents whom strong provider recommendations for the vaccine may be the most influential.^{15,16} Past research demonstrates that providers often underestimate the importance parents place on HPV vaccination.¹⁷ By failing to give strong recommendations for the HPV vaccine to these parents, providers may be missing many opportunities to increase HPV vaccine utilization.

A high proportion of parents in our study (43%) reported spending five or more minutes discussing the HPV vaccine

Table 4. Relationship between strength of provider's recommendation for HPV vaccine and HPV vaccine intentions or receipt.

	Provider Very Strongly Recommended HPV Vaccine, Column-% (n), n = 133	All Other Provider Recommendation Categories Column-%, (n), n = 210	p-value
Received Any HPV Vaccine Doses^a			
Yes	71% (88)	39% (75)	<0.001
No	29% (36)	61% (118)	
Intend to Get HPV Vaccine if No Doses Received Previously^b			
Yes	82% (31)	60% (62)	0.015
No	18% (7)	40% (42)	

Skipped responses are excluded. Study occurred April 2014.

^a n=317 respondents, excludes 39 participants who did not answer, or responded "don't know" to the question "Has your adolescent received any doses of HPV vaccine"

^b n=142 respondents who indicated their adolescent had not definitively gotten any HPV vaccine doses in the past.

with their provider, though the accuracy of this outcome could be influenced by recall error. With clinical visits typically lasting between 15–20 minutes, a large amount of time spent on the vaccine discussion means less time for other important topics to be covered, and can also lead to provider burn-out for convincing parents to get vaccinated.^{18,19} However, based on this and other studies,^{20–24} parents appear to be open to receiving other types of HPV vaccine-related communication such as decision-making tools, pictures of vaccine-preventable diseases, and lists of frequently asked questions. Technology-based interventions such as websites that provide personalized educational information also show promise in this regard.^{21,24–28} Our group is currently testing the impact of each of these strategies on the frequency with which providers strongly recommend HPV vaccines for their youngest (11–12 years) adolescent patients, and the impact on adolescent HPV vaccine utilization.

An interesting finding from this study was the lack of difference in provider recommendation strength by any patient demographic factor. Though our study lacked significant heterogeneity with regard to race, ethnicity, education and income, the sample was roughly evenly divided between parents of girls versus boys. Past research has shown that providers often differ in their HPV vaccine recommendation practices based on the gender of their patient, with females generally receiving stronger and more consistent vaccine recommendations than males.^{29–31} The lack of gender based differences in HPV vaccine communication reported by parents in our study is encouraging, and may suggest that providers are adopting a more gender neutral approach to HPV vaccination as is recommended.^{32–34}

This study should be interpreted in light of important limitations. First, our analysis focused specifically on parents' recall of provider communication about vaccines at their child's past well child check-up. Errors in recall could result in data that may not reflect the actual communication methods used by the providers. This is especially relevant considering that 14% of the sample reported not having a well child check-up in the past year. However, it could be argued that parents' perception and recall of the information is equally as important as what information was actually conveyed, since it is based on these perceptions that decisions about vaccines are made. In an ongoing randomized controlled study, we are prospectively collecting data to assess the impact of a provider communication toolkit on these adolescents' providers' communication practices and time spent discussing vaccines. These data will be important to validate the results from this study and will provide an understanding of how much parental recall errors could have affected our results. An additional limitation of the study is that the subject population was from a limited geographic area, and had income, educational levels, and racial characteristics that are not generalizable to the US population. Additional studies will be needed to confirm our results more broadly. Finally, we asked parents about hypothetical decision-making about vaccines, which may not reflect actual vaccination behavior.

Conclusions

This study demonstrated that parents of adolescents report receiving “very strong” recommendations for HPV vaccines for their adolescents less frequently than for other vaccines.

Receiving a very strong recommendation for HPV vaccine was associated with an increased likelihood of HPV vaccine intention and receipt. While written informational materials about HPV vaccines were reported as widely used by providers, nearly all parents were interested in also receiving HPV vaccine-related information through additional sources such as web-based materials provided before their adolescent's next check-up, FAQ sheets, and pictures of HPV-related diseases. These additional communication strategies may streamline clinical visits and should be evaluated for their ability to increase the proportion of adolescents receiving HPV vaccine.

Methods

Study overview and population

We conducted a cross sectional survey of parents of adolescent children seen at 16 primary care practices (6 private pediatric offices, 6 public pediatric offices, and 4 private family medicine offices) in the Denver metro area. Young adolescents were generally defined as 11–14 year olds except at two practices that routinely provided adolescent vaccines beginning at age 9. For these practices young adolescents were defined as 9–14 year olds. A study sample of 50 parents of young adolescents in the specified age range for that clinic was randomly drawn using stratified sampling from each practice. The first level of stratification was child gender (25 males and 25 females) followed by presence of a well-child check-up during the past year within each gender (17 with and 8 without a well-child check-up). A paper-based survey was provided via postal mail from April to August 2014 with up to 5 mailed or phone reminders provided to non-respondents over a period of 17 weeks. A \$5 incentive was provided in the initial mailing. Non-respondent parents were sent an additional \$5 if they completed the survey after the 3rd mailing. All study activities were approved by Colorado's Multiple Institutional Review Board.

Measures

This survey was conducted as a “pre-intervention” survey to provide baseline data for a cluster randomized trial evaluating the impact of a clinician toolkit on provider communication strategies and subsequent HPV vaccination rates among young adolescents. The survey queried parents about provider communication regarding adolescent vaccines in general, with several additional questions focused on HPV vaccines specifically. Survey topics and question formats were informed by a review of the literature to identify relevant variables related to parental attitudes about HPV vaccines^{6,11,24,29,31,35} and previously described provider communication strategies for HPV or other vaccines.^{7,11,15,20,28,36,37} In addition, a series of questions to assist the development of a multi-modal “provider toolkit” for the larger trial were also included. Categorical responses were used to assess parents' recall of vaccine communication activities used by the practice for adolescent vaccines in general, the length of HPV vaccine discussions specifically, whether or not HPV vaccine doses had been received previously by the young adolescent, and demographic characteristics. Likert scales assessed the strength of provider recommendation for each of the 4

adolescent-targeted vaccines (very strongly, somewhat strongly, not very strongly, recommended against the vaccine, or not applicable – did not talk about this vaccine), vaccination attitudes about HPV vaccines specifically (agree strongly, agree somewhat, disagree somewhat, disagree strongly) and usefulness of proposed new communication techniques regarding HPV vaccines (definitely use, probably use, probably not use, definitely not use or; very useful, somewhat useful, not that useful, or not at all useful). In many cases, responses were later grouped based on the overall distribution of responses for that question.

Sample size

To operationalize our hypothesis that the need for provider communication tools would be higher for HPV vaccines compared to other adolescent vaccines, we used the outcome of the proportion of parents who report their young adolescent's provider gave "very strong" recommendations for each vaccine vs. all other responses. Similarly, for the outcome of parental attitudes and likelihood of having their child vaccinated, we dichotomized parents based on provider recommendation strength. Using the most conservative proportional estimate of values (centered on 50%) and standard parameters ($\alpha=0.05$, $\beta=0.80$) we estimated that a sample size of 173 participants per arm (346 total) would allow detection of a 15% difference in each of these outcomes.

Analysis

Descriptive statistics were generated for all survey questions. Associations between the various outcome measures and potential predictor variables were assessed using Chi-square or Fisher's exact tests as appropriate. All analyses were performed in SAS 9.4 (Cary, NC).

Highlights

- Provider communication varies by type of adolescent vaccine under consideration.
- "Very strong" recommendations are less frequent for HPV vaccine than others.
- "Very strong" HPV vaccine recommendations are associated with higher vaccine use.
- Even with strong recommendations, most parents still want more HPV information.
- Parents strongly support providers using technology-based communication methods.

Abbreviations

Tdap	tetanus diphtheria – acellular pertussis vaccine
MCV	meningococcal vaccine
HPV	human papillomavirus
CDC	Centers for Disease Control and Prevention

Disclosure of potential conflicts of interest

Amanda Dempsey serves on Advisory boards for Merck and Pfizer. These companies played no role in this research study. Dr. Dempsey does not

receive research support from either company. All other authors have no conflicts of interest to declare.

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