



ELSEVIER

 JOURNAL OF
**ADOLESCENT
 HEALTH**

www.jahonline.org

Original article

Pediatrician-Parent Conversations About Human Papillomavirus Vaccination: An Analysis of Audio Recordings



Lynne Sturm, Ph.D.^{a,*}, Kelly Donahue, Ph.D.^b, Monica Kasting, Ph.D.^{c,1}, Amit Kulkarni, Ph.D.^d,
 Noel T. Brewer, Ph.D.^e, and Gregory D. Zimet, Ph.D.^f

^a Department of Pediatrics, Riley Child Development Center, Indiana University School of Medicine, Indianapolis, Indiana

^b Department of Pediatrics, Section of Adolescent Medicine, Indiana University School of Medicine, Indianapolis, Indiana

^c University Fairbanks School of Public Health, Indianapolis, Indiana

^d Global Health Outcomes, Merck & Co., Inc., Kenilworth, New Jersey

^e Department of Health Behavior, Gillings School of Global Public Health, University of North Carolina, Chapel Hill, North Carolina

^f Department of Pediatrics, Section of Adolescent Medicine, Indiana University School of Medicine, Indianapolis, Indiana

Article history: Received November 30, 2016; Accepted February 8, 2017

Keywords: HPV vaccination; Health communication; Cancer prevention

A B S T R A C T

Purpose: We sought to establish which human papillomavirus (HPV) vaccine communication approaches by pediatricians were associated with same-day HPV vaccination of 11- to 12-year-olds by evaluating audio recordings of visits.

Methods: Verilogue, a market research company maintaining a panel of primary care pediatricians, provided audio recordings and transcriptions of well-child visits for 11- to 12-year-old patients from January through June 2013. Seventy-five transcripts from 19 pediatricians were coded for use of presumptive language (i.e., words conveying assumption of vaccine delivery), offer of delay, recommendation strength, and information provision. Using logistic regression, we evaluated the association between pediatrician communication approaches and agreement to same-day HPV vaccination. Generalized estimating equations accounted for clustering of patients within pediatricians.

Results: Same-day agreement to HPV vaccination occurred in 29% of encounters. Pediatricians in the sample often provided parents with inconsistent, mixed messages and sometimes offered information about HPV or HPV vaccination that was inaccurate. Pediatricians used presumptive language in only 11 of 75 encounters; when used, presumptive language was associated with higher odds of accepting HPV vaccine (73% vs. 22%; odds ratio = 8.96; 95% confidence interval = 2.32–34.70). Pediatricians offered or recommended delay in most encounters (65%). HPV vaccine acceptance occurred far more often when pediatricians did not mention delaying vaccination (82% vs. 6%; odds ratio = 80.84; 95% confidence interval = 15.72–415.67). Same-day vaccination was not associated with strength of recommendation or pediatrician reference to vaccinating their own children.

Conclusions: Our findings highlight the need to develop and evaluate physician-focused trainings on using presumptive language for same-day HPV vaccination.

© 2017 Society for Adolescent Health and Medicine. All rights reserved.

IMPLICATIONS AND CONTRIBUTION

Provider recommendation strongly motivates parents to get human papillomavirus (HPV) vaccine for their adolescent children, but many providers do not offer effective recommendations to these parents. This naturalistic observational study confirms that ineffective pediatrician communication about HPV vaccination is common and identifies urgency and a presumptive approach as critical for motivating same-day HPV vaccination.

Conflicts of Interest: A.K. is an employee of Merck. The other authors have no conflicts of interest to disclose.

* Address correspondence to: Lynne Sturm, Ph.D., Riley Child Development Center, Indiana University School of Medicine, 705 Riley Hospital Drive, Rm. 5837, Indianapolis, IN 46202.

E-mail address: lsturm@iu.edu (L. Sturm).

¹ Present address: Department of Health Outcomes & Behavior, 12,902 Magnolia Drive, MRC-CANCO NT, Tampa, FL 33612.

Human papillomavirus (HPV) vaccination coverage in the United States continues to be far below the Healthy People 2020 target of 80% series completion by ages 13–15 years [1,2]. To augment public health messaging campaigns, public health officials and clinicians seek to identify modifiable aspects of health care provider (HCP)–parent/patient communication about vaccination that may influence acceptance of HPV vaccination.

Among parents' most commonly reported reasons for non-vaccination are lack of physician offer/recommendation of HPV vaccine or physician acceptance of parental wish to delay [3–6]. Many physicians do not meet quality indicators, such as making a recommendation that is strong, timely (i.e., vaccination by ages 11–12 years), consistent across the patient panel (i.e., making routine rather than risk-based endorsement of vaccination), and urgent (recommending same-day rather than delayed vaccination) [7]. A recent systematic review underscored the importance of physician confidence about HPV vaccine communication [8]. However, as most of these studies involved HCP self-report, the quality of HPV vaccine communication may be even poorer than reported due to socially desirable responding [9,10]. In addition, studies of parents' recollections of their interactions with HCPs suggest that poor-quality communication is associated with lower HPV vaccine uptake [11].

In contrast to self-report and retrospective report of clinical encounters, objective observation of conversations between pediatricians, caregivers, and adolescents may clarify communication strategies that encourage or discourage vaccination uptake. For example, in an observational study that focused on early childhood immunization, the results indicated that using presumptive language (i.e., words conveying assumption of vaccine delivery) led to higher rates of vaccine acceptance compared with a participatory approach [12]. The present study had the following objectives:

- 1) To describe the frequencies of pediatrician HPV vaccine communication behaviors;
- 2) To evaluate the associations between pediatrician HPV vaccine communication behaviors and parental agreement to same-day HPV vaccination; and
- 3) To describe common themes observed across pediatricians' discussions about HPV vaccination.

To meet these objectives, we used quantitative and qualitative analyses of audio recordings/transcripts of full clinical encounters between pediatricians, 11- to 12-year-old patients, and their caregivers.

Methods

Study population and transcript preparation

The point of practice national physician panel maintained by Verilogue provided audio recordings and transcripts of patient visits between January and June 2013. The company gave pediatricians digital recording devices to audio-record entire well-child visits. After obtaining caregiver consent (any adult accompanying the minor patient to the well visit), the pediatrician audio-recorded the entire patient encounter. Eighty percent of parents/patients agreed to participate (Jane Neihaus, Verilogue, written communication, June 6, 2014). Separate conversations with nurses were not recorded. Families received compensation for their participation. Providers, caregivers, and

patients were unaware that analysis of the recordings would focus specifically on HPV vaccine communication. Pediatricians securely transmitted patient visit audio-recording to Verilogue, along with patient age, race, ethnicity, and insurance type as well as pediatrician sex, years in practice, and practice type. The company deidentified personal information for the patient and pediatricians and provided us with transcripts of entire patient encounters with pediatricians. The study received exempt status from institutional review boards at Indiana University and the University of North Carolina.

The Verilogue participant panel is recruited from lists of board-certified physicians. The panel includes pediatricians who participate in research for a 12-month period (Jane Neihaus, Verilogue, written communication, June 6, 2014). Verilogue invites physicians from all states to participate in research, except for those states in which pharmaceutical market research is prohibited such as Vermont. For this study, Verilogue included conversations recorded by physicians practicing in the following states: AZ, CT, FL, GA, IL, IN, LA, MI, NC, NY, OH, SC, TX, and WI (Bill Petitto, Verilogue, written communication, February 3, 2017). The panel included 44 board-certified pediatricians, and 20 of these pediatricians had patient visits during the study period with 11- to 12-year-olds, resulting in a sample of encounters with 100 patients. Of these encounters, 25 were excluded because a caregiver was not present during the visit, discussion did not touch on vaccination of the child, or the child started the HPV vaccination series at a prior visit. This resulted in 75 usable transcripts from 19 providers; there was no minimum or maximum number of patients per physician required for inclusion.

Transcript coding

Using a directed qualitative analysis approach [13], we developed categorical codes to characterize HPV vaccine communication approaches and themes of interest based on prior research on physician–parent communication regarding vaccination [7,12,14,15]. The codes captured whether the pediatrician (1) used presumptive versus nonpresumptive language; (2) strength of recommendation for HPV vaccine (i.e., strong, moderate, weak, or no recommendation); (3) offered/recommended delay of vaccination; (4) used a risk-based approach to the need for HPV vaccination; (5) provided information, including misinformation, about HPV infection or vaccination; (6) responded to parent hesitancy with, for example, immediate acquiescence, provision of additional information, or elicitation of specific parent concerns with the goal of vaccine acceptance; (7) specifically mentioned sexual transmission of HPV; (8) shared personal vaccination practices (i.e., pediatrician vaccinating own or future offspring); and (9) engaged in lengthy scientific monologues about HPV vaccination.

The investigators jointly developed a provisional codebook of categorical definitions for each code. Examples of quotes that correspond to codes appear in Table 1. To insure reliability, pairs of coders (MK, KD, and LS) independently coded 20 of the transcripts to confirm similar approaches to coding. Initial intercoder percent agreement was .80 or better for all but one category. The team resolved discrepancies through discussion until consensus and recoded transcripts accordingly.

Quantitative measures

The outcome of interest, vaccine acceptance, was defined as same-day caregiver agreement to HPV vaccination. Definite

Table 1
Example quotes for communication behaviors

Communication behavior	Example quotes
Presumptive style	<p>Yes: “Got a couple of shots today. The ones you're getting are an Adacil, Menactra and the HPV.” (girl; female MD from GA, 21–30 years practice); “We've got tetanus, meningitis, the HPV. And we can get that going for you” (girl; male MD from SC, 21–30 years practice)</p> <p>No: “the HPV, which is the Gardasil you absolutely do not need to do at [AGE] years of age” (boy; male MD from FL, 11–20 years practice); “Can I interest you at all in Gardasil shot?” (girl; male MD from FL, 11–20 years practice)</p>
Strength of recommendation	<p>Weak: “they do recommend it for boys” (boy, male MD from FL, 11–20 years practice) Moderate: “I think it's an important vaccine & I think it's good, ok.” (boy, male MD from FL with 11–20 years practice) Strong: “I do however recommend it completely between now and being 18” (male, female MD from IN, 11–20 years practice).</p>
Offer of delayed vaccination	<p>“I know the nurse wrote down all these different vaccines. You obviously do not have to do all of them (laugh). Uh, the HPV which is the Gardasil, you absolutely do not need to do at this age...there is no urgency in a [AGE] to do it (laugh).” (boy; male MD from FL, 11–20 years practice) “I like that & I would like for her to have that but I don't care when.” (girl; female MD from GA, 21–30 years practice)</p>
Reference to vaccinating own child	<p>“Doctors ain't supposed to say this but for what it's worth, my two teenage boys have gotten it. You know?” (boy; male MD from OH, 21–30 years practice) “As far as I'm concerned, if I had any boys they'd, you know, they'd be getting it. Both my daughters got theirs at, as soon as it became available.” (boy, male MD from AZ; 21–30 years practice)</p>
Risk-based approach to need for HPV vaccine	<p>“She's not at an age where she is going to be having any risk factors.” (girl; male MD from WI, 11–20 years practice) “But as long as it's before he's sexually active which he better not be because then he'd have to answer to his pediatrician and his mama.” (boy, male MD from GA, 21–30 years practice)</p>
Provides information about HPV infection or vaccine	<p>“There's not, as far as we know, there's not a genetic predisposition.” (girl, male MD from WI, 11–20 years practice) “They do now recommend Gardasil for boys. It's approved from the Food & Drug Administration from 9 all the way up to 28.” (girl; female MD from FL, 11–20 years practice) “It's the one for cervical cancer to prevent the virus that causes that one.” (girl, female MD from GA, 21–30 years practice)</p>
Provides misinformation	<p>“It's good at any age” (girl; female MD from GA, 21–30 years practice) “Other research looking at the uterine & ovarian cancer with the HPV causing some of that too (boy; male MD from TX, 21–30 years practice) “Women can actually pick up cancer from this vaccine.”(boy; male MD from SC, 21–30 years practice)</p>
MD response to caregiver hesitancy/refusal	<p>MD: “...and then eventually the Gardasil shot. That's the cervical cancer vaccine.” CG: “no”. MD: “OK”. CG: “No, we are definitely skipping it.” MD: “So one today, the tetanus?” (girl; male MD from IL, 11–20 years practice). CG: “I'm just making sure that it didn't make him grow boobies or anything like that”. MD: “no, it won't do nothing bad, do nothing bad.” (boy, female MD from OH, 21–30 years practice) MD: “So what kind of questions do you have about it that you're unsure? Why don't you want to do it?” (girl; male MD from NC, 31+ years practice)</p>
HPV-sexual activity linkage	<p>“Well, the thing is, it protects, the virus is passed back and forth between boys & girls.” (male, female MD from SC, 3–10 years practice) “You've got to get that in there before they enter that stage of life” (boy, male MD from OH, 21–30 years practice) “And it's not, most of the time you hear about it being transmitted sexually, but not all cases.” (boy, male MD from Texas, 21–30 years practice)</p>
Scientific monologue	<p>“Okay. Yeah, it's funny, I was talking to a father a few months ago, um, his boy actually came in for a college physical. He just got accepted to college and decided he wanted to come in. Um, and sort of at the end of our visit I said to him I just wanted to let you know that the cervical cancer vaccine for girls, which has been around for about nine years or something like that, uh, just got approved for boys two years ago. And he looks at me and he says, well the last time I checked my boy doesn't have a cervix. Uh, yeah and I said, yeah, I realize that. But do you have any girls? He said, yeah, I have a daughter. And I said, I'll tell you what, let's not do any of the girls. Just do all the boys. ...You know, boys get it and they generally have no symptoms other than they give it to the girls and then the girls can get cervical cancer. There is a slight like, um, increased risk of like cancer of the penis and cancer of the anus with human papilloma virus.” (boy, male MD from OH; 21–30 years practice)</p>

HPV = human papillomavirus.

acceptance was a caregiver statement of wanting the vaccination for the child or agreement with a provider recommendation, (e.g., “ok” and “uh huh”), and we assumed probable acceptance when the caregiver did not make a verbal statement of refusal. Codings of definite and probable comprised the category “accepted.” Caregiver statements of definite refusal (e.g., “I don't

want that one” and “no”) or those coded “unclear” were combined into the category “not accepted.” Medical chart data submitted by participating pediatricians did not include documentation of vaccination at the medical encounter.

Predictors included the following subset of categories, which lent themselves to quantitative coding:

Presumptive approach (yes, no). A presumptive approach featured a matter-of-fact statement that the child was due for or would receive HPV vaccine that day or at a future date, conveying a positive stance toward vaccination (e.g., “The ones you’re getting are an Adacel, Menactra and the HPV”; “The HPV—you will get that next time”). In contrast, a nonpresumptive style involved questions or uncertainty (e.g., “And you could get HPV. Do you want [it]? Have you thought about [it]? Are we doing HPV today?”; see Table 1 for additional examples).

Strength of recommendation (weak, moderate, strong, and no recommendation). Weak recommendations featured passive voice (e.g., “it is recommended”) or third-person attribution of recommendation (e.g., “professional organizations recommend”). Moderate recommendations required a first-person singular or plural statement (e.g., “I/we recommend.”) Strong recommendations involved first-person singular or plural statement as well as emphasis words such as “strongly” or “definitely,” (e.g., “I strongly recommend that he gets the HPV vaccine”). Mentioning HPV vaccine without a clear endorsement was not considered a recommendation.

Offer of delayed vaccination (yes, no). Offer of delay occurred when pediatricians stated that the parent could choose to vaccinate at a later point or clearly recommended that the parent wait to vaccinate until later (e.g., “I usually wait ‘til 13 on that one [HPV].”) In a few cases in which pediatrician discourse could not be clearly coded, “no delay” was assigned.

Reference to vaccinating own child (yes, no). This code included instances when pediatricians referred to having their own child receive HPV vaccine or stated that they would vaccinate their child if they had children (e.g., “I’ve done my two girls. I haven’t done my boys yet but probably will in the next few years”).

Quantitative data analysis

The unit of analysis was patient visit. Logistic regression analyses assessed the following four pediatrician behaviors as potential predictors of parental agreement to HPV vaccination: presumptive approach, strength of recommendation, offer of delayed vaccination, and reference to vaccinating own child. Analyses used generalized estimating equations to account for correlated data due to the clustering of patients within pediatricians. Child sex differences in offer of delay and strength of recommendation were examined with chi-square analyses. Using chi-square analyses, we examined whether particular communication behaviors systematically co-occurred—presumptive approach, strength of recommendation, and offer of delay.

Results

Pediatricians were experienced, all from private practices in urban settings, located predominantly in the Midwest and South (Table 2). The majority of well-child visits were with white patients; 34 were with girls (45%) and 41 boys (55%) aged 11 or 12 years. Less than one third of the visits (29%) resulted in same-day vaccine acceptance, which was not associated with patient sex ($p = .45$).

Table 2
Patient and pediatrician characteristics

	n (%)
Patients (n = 75)	
Sex	
Male	41 (55)
Female	34 (45)
Insurance type	
Preferred provider organization (PPO)	38 (51)
Medicaid	16 (21)
Private	12 (16)
Health maintenance organization (HMO)	8 (11)
No insurance	1 (1)
Race	
White	55 (73)
Black/African-American	11 (15)
Mexican/Puerto Rican/other Hispanic	6 (8)
Middle-Eastern/other Asian	3 (4)
Pediatricians (n = 19)	
Gender	
Male	15 (79)
Female	4 (21)
Years in practice	
3–10	1 (5)
11–20	8 (42)
21–30	8 (42)
31 +	2 (11)
Practice location	
South	9 (47)
Midwest	7 (37)
Northeast	2 (11)
West	1 (5)
Number of Transcripts per pediatrician	
Mean	3.9
Range	1–9

Qualitative analysis of pediatrician discussion of human papillomavirus vaccine

Pediatrician communication about HPV vaccine created impressions of “mixed messages,” and pediatricians were often inconsistent in their communication approaches across patients. Pediatricians often made recommendations alongside an offer/recommendation of delay, in effect diluting the initial recommendation (see Table 1). Pediatricians often treated HPV vaccine differently from Tdap and meningococcal conjugate vaccine. (Hepatitis A and seasonal influenza vaccines were discussed infrequently.) Pediatricians portrayed non-HPV vaccines as “required by school/camp” or “routine” but HPV vaccine as “optional,” a matter of parent choice. One provider, after giving a brief, presumptive recommendation for two vaccines, said “Gardasil is the one to discuss.” Pediatricians more often referred to mode of transmission for HPV infection than for other vaccine-preventable diseases. Some pediatricians made direct statements about sexually transmitted infection or sexual transmission (e.g., “It is sexually transmitted and girls and boys pass it back and forth”), but many statements were less direct (see Table 1) and involved vague links between vaccination timing and projected future sexual relationships (e.g., “He’s not at the age where he’s doing anything immediately”).

A few pediatricians discussed HPV vaccine as they did other vaccines, employing a brief, matter-of-fact presumptive style with HPV vaccine at the end of a list of vaccines for which the child was “due.” These providers tended to offer a strong recommendation (e.g., “It’s not required but strongly recommended”), even in cases where they accommodated the parent’s desire to delay (e.g., “ok...Eventually she will get the Gardasil”).

Back-and-forth dialogue about HPV vaccine in which parental questions or concerns were elicited was not the norm. Instead, pediatricians sometimes provided a monologue of scientific facts (see Table 1.) Information about other vaccines was usually limited to, “It guards against (disease).” Misinformation about duration of protection and cancer targets was common (e.g., “HPV causes colon cancer”; “The vaccine covers 100% for life.”) Some pediatricians referred to their personal decisions to vaccinate their own or future children against HPV, an approach not used with other adolescent vaccines.

Many pediatricians offered or recommended delaying vaccination before caregivers voiced any reaction to HPV vaccine such that caregivers agreed with delaying rather than directly voicing refusal of an offered vaccine. Common rationales for delay included the child being “too young” and that children the patient’s age were not at risk for sexual behavior. Some of these pediatricians seemed to hold a preconception that they must introduce HPV vaccine gradually over multiple visits. They made reference to either discussing HPV vaccine at a prior visit or voiced an intention to familiarize the family with the topic at the current visit, with plans to revisit the vaccination decision at a future visit.

When pediatricians encountered caregiver hesitancy or concern about possible side effects of HPV vaccine, they typically acquiesced at once. A few pediatricians explored the parents’ concerns (e.g., “So what kind of questions do you...have about it that you’re unsure? Why don’t you want to do it?”). One pediatrician leveraged the parent’s stated desire to discuss the vaccine with her daughter at home by offering written material to review at home after the vaccination occurred.

Few caregivers independently raised the topic of HPV vaccination. One pediatrician began with “The only other vaccine that we don’t have to do this year, um, but actually” to which the caregiver responded “HPV” and then asked about her son’s history of warts (nongenital).

Predictors of same-day human papillomavirus vaccine acceptance

Pediatricians employed a presumptive approach in 11 of 75 visits (Table 3). Visits where a pediatrician used presumptive language had HPV vaccine acceptance 73% of the time, whereas acceptance occurred only 22% of the time when presumptive language was not used. A presumptive approach was associated with nine times greater odds of same-day vaccination (odds ratio = 8.96; 95% confidence interval = 2.32–34.70).

Pediatricians mentioned delay of HPV vaccination in 49 of 75 visits. When delay of vaccination was offered or recommended, only 6% of caregivers agreed to vaccinate, compared with 82% agreement when delay was not mentioned. With no mention of delay, odds of agreement to vaccination were 81 times greater (odds ratio = 80.84; 95% confidence interval = 15.72–415.67). Strength of recommendation ($p = .94$) and pediatrician reference to vaccinating own children ($p = .58$) were not associated with HPV vaccine acceptance. Use of presumptive language, strength of recommendation, and offer of delay co-occurred in unexpected ways. Some providers who adopted a presumptive approach mentioned but did not directly recommend the vaccine. In the visits in which pediatricians used presumptive language, visits were split between no recommendation (6 of 11, 55%) and endorsement of HPV vaccine (5 of 11; 45%). Offering delay occurred in only 2 of 11 presumptive language visits (18%).

Table 3
Prevalence of communication styles

Communication style	N (%)	N (%) vaccinated
Strength of recommendation		
No recommendation	25 (33%)	7 (28%)
Weak	19 (25%)	5 (26%)
Moderate	26 (35%)	8 (31%)
Strong	5 (7%)	2 (40%)
Presumptive language		
Yes	11 (15%)	8 (73%)
No	64 (85%)	14 (22%)
Offer of delay		
Yes	49 (65%)	3 (6%)
No/unclear	26 (35%)	19 (73%)
Reference to vaccinating own child		
Yes	13 (17%)	3 (23%)
No	62 (83%)	19 (31%)

In contrast, offering delay accompanied 47 of 64 nonpresumptive language visits (73%). In the encounters in which pediatricians did not recommend the vaccine, 60% (15 of 25) offered delay.

No patient sex differences were found in pediatrician offer of delay ($p = .88$), presumptive recommendation ($p = .62$), or strength of recommendation ($p = .45$).

Discussion

Our research showed that offering to delay HPV vaccination and failure to use presumptive language were very strong predictors of nonacceptance of vaccine. The findings in this research extend those reported by two prior studies that also analyzed audio-recorded HPV vaccination discussions between patients/parents and providers. Whereas those studies examined both adolescent and adult women (aged 11–26 years) [14] or adolescent females and males spanning 11–17 years [16], we focused specifically on patients aged 11–12 years, the ages when HPV vaccination is routinely recommended. Moreover, our larger sample size of early adolescents, compared with the previous studies of medical dialogues, allowed us to conduct both qualitative and quantitative analyses. Finally, the Verilogue physician panel is drawn from multiple geographic locations rather than from a health system of clinics in a single city or state [16], improving potential generalizability of findings.

A geographically diverse sample of pediatricians seeing children aged 11 and 12 years, typically conveyed a mixed message about HPV vaccine by treating it differently from other vaccines, offering to delay or acquiescing to parental desire for delay, and failing to make clear, strong recommendations. Few used presumptive language that the child is due for HPV vaccination, although this was associated with higher same-day vaccination [12,17]. Although many pediatricians in our sample provided at least basic information about the vaccine or HPV infection, their communications often had factual inaccuracies, used risk-based language, and inconsistently educated about the vaccine preventing one or more cancers.

Research documents physician anticipation of parental hesitancy regarding HPV vaccination [8]. It is possible that expectations of parental resistance to pediatricians’ recommendations may discourage some pediatricians from communicating clearly about certain issues. For example, Mangione-Smith et al. [18] found that physician perception of parental desire to have an antibiotic prescribed for their child often did not match parental expectations. Similarly, Healy et al. [19] reported that HCPs

particularly and significantly underestimated parental interest in HPV vaccination compared with other vaccines. Gilkey et al. [15] found that only 13% of providers felt that parents viewed HPV vaccine as important for their child's health. Some pediatricians may cope with their expectation of parental hesitancy about, or resistance to, HPV vaccination by gradually introducing the topic to parents. We suggest that when pediatricians expect parental hesitancy, they may actually fuel parental hesitancy and reduce the likelihood of vaccine acceptance—a self-fulfilling prophecy.

Limitations include use of a selected sample of pediatricians and no medical record verification of same-day vaccination. The modest sample size prevented us from conducting analyses adjusted for sociodemographic characteristics and contributed to large confidence intervals in the logistic regression analyses. Future studies could include a probability sample of providers to help ensure generalizability, more audio recordings per physician, and access to medical records or state vaccination registries for vaccination verification. It would also be useful to examine the role of adolescent patients in conversations about vaccine decisions. Our impression was that patients were more likely to voice distress about getting shots in general than resistance to HPV vaccine. Future research should examine communication styles of other vaccine-provider professionals, including family physicians, nurses, and pharmacists. It would be helpful to better understand which physician, caregiver, and patient characteristics drive physicians' use of different communication behaviors with different families. Physicians, caregivers, and patients being unaware of the research focus on HPV vaccination lends credibility to our data and largely eliminates the problem of socially desirable responding. A potential limitation is that awareness of audio-recording a visit may have altered physician behavior, resulting in what the physician might consider his/her "best case" communication behavior.

The findings from this study are consistent with, and add substantially to, the emerging literature on physician-family communication about HPV vaccination. This study identifies urgency and presumptive communication as critical for motivating same-day HPV vaccination.

Acknowledgments

Portions of the research were presented at EUROGIN 2016. All authors contributed to the conceptualization of the study, to the design, and the analysis of study findings.

Funding Sources

Support for this study was provided by Merck research funds and by the Indiana University-Purdue University Center for HPV

Research which is funded by the Indiana University-Purdue University Signature Centers Initiative and the support of the Indiana University School of Medicine, Department of Pediatrics, and the IU Simon Cancer Center.

References

- [1] Reagan-Steiner S, Yankey D, Jeyarajah J, et al. National, regional, state, and selected local area vaccination coverage among adolescents aged 13–17 years - United States, 2015. *MMWR Morb Mortal Wkly Rep* 2015;64:784–92.
- [2] U.S. Department of Health and Human Services. Healthy People 2020. 2015. Available at: <http://www.healthypeople.gov/2020/topics-objectives/topic/immunization-and-infectious-diseases/objectives>. Accessed May 31, 2015.
- [3] Hughes CC, Jones AL, Feemster KA, Fiks AG. HPV vaccine decision making in pediatric primary care: A semi-structured interview study. *BMC Pediatr* 2011;11:74.
- [4] Donahue KL, Stupiansky NW, Alexander AB, Zimet GD. Acceptability of the human papillomavirus vaccine and reasons for non-vaccination among parents of adolescent sons. *Vaccine* 2014;32:3883–5.
- [5] Perkins RB, Clark JA, Apte G, et al. Missed opportunities for HPV vaccination in adolescent girls: A qualitative study. *Pediatrics* 2014;134:e666–74.
- [6] Nicolai LM, Hansen CE, Credle M, Shapiro ED. Parents' recall and reflections on experiences related to HPV vaccination for their children. *Qual Health Res* 2016;26:842–50.
- [7] Gilkey MB, Malo TL, Shah PD, et al. Quality of physician communication about human papillomavirus vaccine: Findings from a national survey. *Cancer Epidemiol Biomarkers Prev* 2015;24:1673–9.
- [8] Gilkey MB, McRee AL. Provider communication about HPV vaccination: A systematic review. *Hum Vaccin Immunother* 2016;12:1454–68.
- [9] Zimet GD. "A day late and a dollar short": Physicians and HPV vaccination. *Cancer Epidemiol Biomarkers Prev* 2015;24:1643–4.
- [10] Adams AS, Soumerai SB, Lomas J, Ross-Degnan D. Evidence of self-report bias in assessing adherence to guidelines. *Int J Qual Health Care* 1999;11:187–92.
- [11] Gilkey MB, Calo WA, Moss JL, et al. Provider communication and HPV vaccination: The impact of recommendation quality. *Vaccine* 2016;34:1187–92.
- [12] Opel DJ, Heritage J, Taylor JA, et al. The architecture of provider-parent vaccine discussions at health supervision visits. *Pediatrics* 2013;132:1037–46.
- [13] Hsieh H-F, Shannon SE. Three approaches to qualitative content analysis. *Qual Health Res* 2005;15:1277–88.
- [14] Goff SL, Mazor KM, Gagne SJ, et al. Vaccine counseling: A content analysis of patient-physician discussions regarding human papilloma virus vaccine. *Vaccine* 2011;29:7343–9.
- [15] Gilkey MB, Moss JL, Coyne-Beasley T, et al. Physician communication about adolescent vaccination: How is human papillomavirus vaccine different? *Prev Med* 2015;77:181–5.
- [16] Shay LA, Street RLJ, Baldwin AS, et al. Characterizing safety-net providers' HPV vaccine recommendations to undecided parents: A pilot study. *Patient Educ Couns* 2016;99:1452–60.
- [17] Moss JL, Reiter PL, Rimer BK, Brewer NT. Collaborative patient-provider communication and uptake of adolescent vaccines. *Soc Sci Med* 2016;159:100–7.
- [18] Mangione-Smith R, McGlynn EA, Elliott MN, et al. The relationship between perceived parental expectations and pediatrician antimicrobial prescribing behavior. *Pediatrics* 1999;103(4 Pt 1):711–8.
- [19] Healy CM, Montesinos DP, Middleman AB. Parent and provider perspectives on immunization: Are providers overestimating parental concerns? *Vaccine* 2014;32:579–84.